

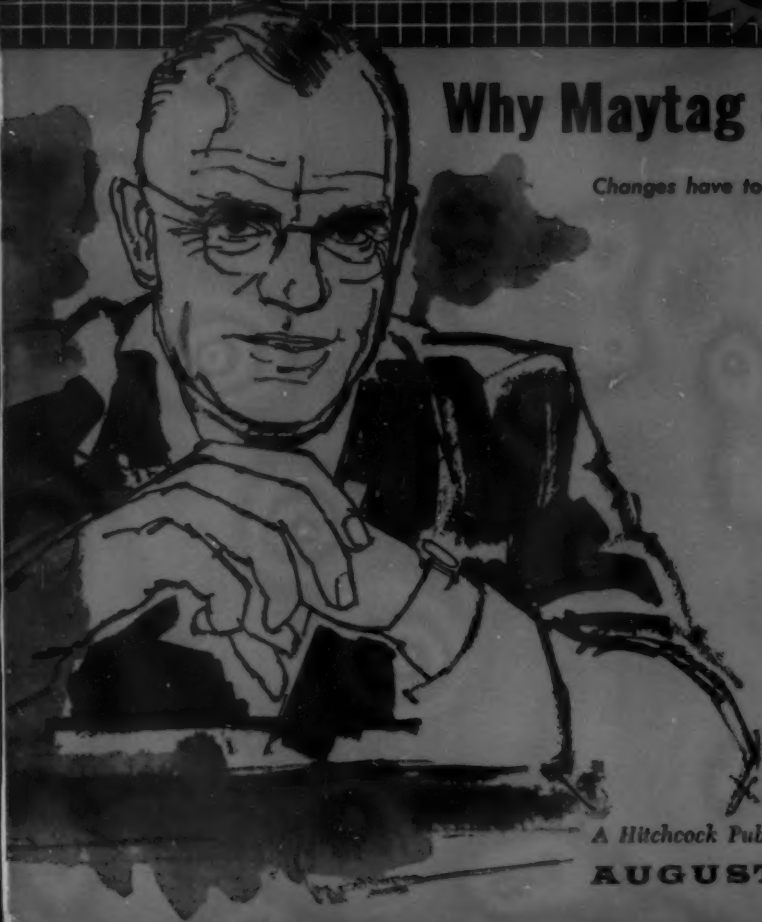
Machine and Tool **BLUE BOOK**



Why Maytag Succeeds:

Changes have to be better, not just new

Page 87



A Hitchcock Publication

AUGUST • 1959

ever see a METAL SAW

that thinks
for itself?



MARVEL SAWS'
Automatic "Brain"
Adjusts Blade
Feed Pressure
and Depth on
Every Stroke to

GIVE YOU FASTER
CUTTING-OFF

The exclusive automatic Dual Power Feed built into every MARVEL Series 6 and 9 Hack Saw is the "brain" that adjusts and compensates both pressure and depth of feed correctly in proportion to the number of blade teeth in contact with the work. Once the MARVEL Dual Feed is set, no operator attention is required to insure that the blade is cutting as deeply as possible and practical on every stroke... regardless of the changing area of the work being cut. Whether the Saw is being used for continuous automatic cut-off of identical pieces or a single cut, the MARVEL Dual Feed that practically "thinks for itself" guarantees that the work is cut-off in the fewest possible number of strokes.

Heavy duty MARVEL Series 6 and 9 Hack Saws embody every practical design and operating feature to give you speed, accuracy and operating economy you can find in no other metal cutting saws.

Catalog C85 has complete details, facts and figures on both Marvel metal cutting Hack Saws and Band Saws. Write for it today.



PS-1308

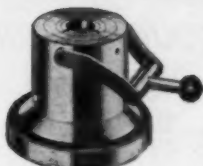
ARMSTRONG-BLUM MFG. CO.
3700 BLOOMINGDALE AVE. • CHICAGO 39, ILL.

 **MARVEL** *Metal Cutting*
Better Machines—Better Blades **SAWS**

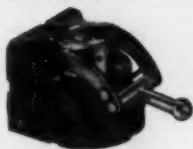
To Eliminate Special Tooling To Speed Set-ups - -



Holding-indexing fixture



Holding fixture



Vertical-horizontal
fixture

USE ZAGAR COLLET FIXTURES



Air-operated
fixture



Collet lathe chuck adaptable
to any lathe, grinder, or ro-
tating spindle. No collet
movement.

In the ZAGAR line of holding fixtures, there's a production plus for all small parts milling, drilling, tapping or grinding. The holding-indexing fixture will index any number of positions from 2 to 25.

Vertical-horizontal fixtures eliminate angle plates. All ZAGAR fixtures are simple in design, hold work without movement, and are versatile in use. Capacity for all—1" and 2".

For more information, write for Bulletin B-8.

Zagar

ZAGAR, INCORPORATED
23900 LAKELAND BLVD.
CLEVELAND 23, OHIO

TOOLS FOR INDUSTRY and SPECIAL MACHINERY

94 ELECTRIC CLUTCH HAND TURRET LATHE

- *MORE PRODUCTION*
- *MORE ACCURATE WORK*
- *FINER FINISH AND*
- *LOWER COST*



FREE
descriptive catalog

THE WADE TOOL CO.
51 RIVER STREET
WALTHAM 54 • MASS.

Use postpaid card. Circle No. 202

MACHINE and TOOL BLUE BOOK



Illustrated—New 9700 Series

Piggy Back Hydraulic Control Valve

Meets J.I.C. Standards

Look to Logan

the ultimate in hydraulic valve design



FREE SEND FOR THE "LOGAN CALCULATOR"

MEMBER: Natl. Mach. Tool Builders' Assn.; Natl. Fluid Power Assn.

LOGANSPORT MACHINE CO., INC.
803 CENTER AVENUE, LOGANSPORT, INDIANA

PLEASE SEND COPY OF CATALOG:

- | | |
|--|--|
| <input type="checkbox"/> 100-1 AIR CYLINDERS | <input type="checkbox"/> 42 SURE-FLOW PUMPS |
| <input type="checkbox"/> 100-2 MILL-TYPE AIR CYL. | <input type="checkbox"/> 200-1 HYD. POWER UNITS |
| <input type="checkbox"/> 100-3 AIR-DRAULIC CYLS. | <input type="checkbox"/> 200-2 ROTOCAST HYD. CYLINDERS |
| <input type="checkbox"/> 100-4 AIR VALVES | <input type="checkbox"/> 200-3 750 SERIES HYD. CYLINDERS |
| <input type="checkbox"/> 100-5 LOGANSQUARE CYLINDERS | <input type="checkbox"/> 200-4 and 200-7 HYD. VALVES |
| <input type="checkbox"/> 100-5-1 ULTRAMATION CYLINDERS | <input type="checkbox"/> 200-4 SUPER-MATIC CYLS. |
| <input type="checkbox"/> 91 PRESSES | <input type="checkbox"/> 70-1 CHUCKS |
| <input type="checkbox"/> FACTS OF LIFE | <input type="checkbox"/> ABC BOOKLET |

☐ CIRCUIT RIDER

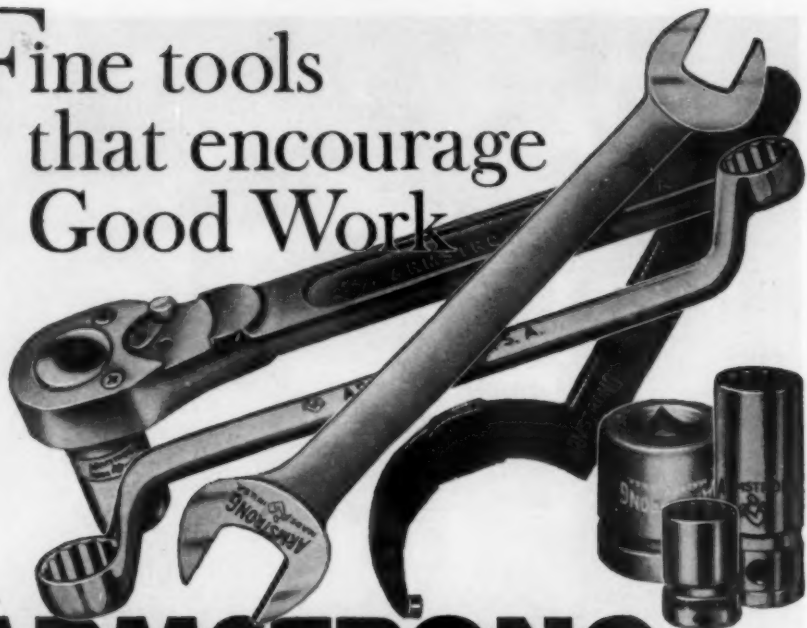
TO:

NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

Fine tools
that encourage
Good Work



ARMSTRONG WRENCHES

*If you don't know your local
ARMSTRONG Distributor,
we will send you the names
of those in your area.*



An ARMSTRONG Wrench feels right—is balanced. It goes over nuts or screw heads easily, grips firmly without sloppiness, won't round corners—because openings are carefully machined to correct sizes. It's safe, strong beyond need without clumsy bulk—because of superior design and selected steels, heat treated to proper degree of hardness and tensile strength. It's quality finished, ARMALLOY (alloy steel) Wrenches in chrome plate with heads buffed; HI-TEN

(carbon steel) Wrenches in baked-on gray enamel with heads ground bright... all plainly marked for size. All are uniformly excellent tools manufactured under strict quality control, by modern methods, with modern equipment in a modern tool plant... 1537 different industrial sizes and types—single wrenches, or sets in metal cases, boxes or rolls... each a quality tool. Armstrong Wrenches are "Fine tools that encourage good work."

ARMSTRONG BROS. TOOL CO. 5208 W. ARMSTRONG AVE. • CHICAGO 46, U.S.A.



Use postpaid card. Circle No. 204

Reader's Guide

MACHINE AND TOOL
blue book

AUGUST, 1959

VOL. 54—No. 8

FEATURES IN THIS ISSUE77

ROUNDUP OF WASHINGTON NEWS81

AS THE EDITOR SEES IT85

Interview

- Why Maytag Is on Top: Everyone Works
at Cost Reduction and Product Reliability— 87
An interview with Fred Maytag II
By PAUL A. MELINE

Numerical Control

- The Pushbutton Age Is Here 97
By DARRELL WARD and PAUL A. MELINE

Industrial Management

- Practical Arbitration, Time Study and Work
Simplification, Part VIII—Should Inspection 108
Jobs Be Put on Incentive?
By HAROLD R. NISSLEY

Die Making

- Refined Steel Rule Die Blanking Process Cuts 116
Costs
By WILLIAM D. ENGSTRAND

Boring

- Boring Large Diameters on Standard Engine 120
Lathes
By MURRAY A. YOUNG

Milling

- High Production Here with Hand Fed Machines 128
By PAUL A. MELINE

Automation

- Tape Controlled Milling Cuts Costs on Atlas 131
Bulkheads

Accepted as Controlled Circulation Publication at Pontiac, Illinois

Copyright, 1959, by the Hitchcock Publishing Company,
Wheaton, Ill.

EPA

**SEE
NEXT
PAGE**

Reader's Guide

continued

Field Reports

Shop Hints

Departments

Editorial Staff

Editorial Advisory Board

Business Staff

Subscription rates:

2 "Firsts" in Machine Tools Unveiled	137
Norton Adds Centerless Grinder to Line	139
Centerless Belt Grinding Tubular Steel Plungers at Otis Elevator Plant	141
Self Feeding Die Holder for Short Run Threading Jobs	143
Reducing Die Maintenance Costs	144
Holding Measuring Wires Inside Internal Gear ..	144
Meetings	78
Free Literature	147
News of the Industry	157
Appointments and Promotions	176
Films and Books	180
What's New in Metalworking	183
The Market Place	248
Don't Overlook These Features	250
Products Index	254
Index to Advertisers	258

WILLIAM F. SCHLEICHER, vice president and editorial director; PAUL A. MELINE, managing editor; DARRELL WARD, engineering editor; D. M. CARLSON, assistant editor; WM. D. ENGSTRAND, western editor; PATRICIA MCNEER, reader's service.

M. JOHN AHLSTROMER, asst. factory mgr., Chicago Screw Co.; RONNIE BURRITT, factory mgr., J. J. TOUREK Mfg. Co.; ED FLUSKEY, consulting eng., Revere Camera Co.; HOMER F. GRIFFITH, works mgr., Construction Equipment Div., International Harvester Co.; JOE KOSINSKI, works mgr., Scully-Jones & Co.; PAUL PRIKOS, vice-pres., Prikos & Becker Tool Co.

ROBERT C. VAN KAMPEN, president; VINCENT C. HOGREN, executive vice president; J. E. HITCHCOCK, vice president; M. L. YONTS, secretary and advertising production manager; OLIVER S. PEPPER, business manager; JOHN S. TODD, production manager; ROBERT L. SPRECKELS, circulation manager; GENE WEST, fulfillment manager; RAYMOND J. SIETSEMA, director of research; BRUCE B. HOWAT, director of marketing; VIC ERICKSON, editorial art director; L. M. SCHROEDER, advertising art director.

Hitchcock District Managers are listed on Page 72.

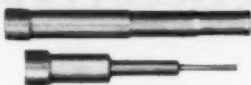
\$5.00 per year in U.S.A. \$6.00 per year elsewhere

CLEVELAND 1 5/8" DIALMATIC

"Increased production 500%", reports Decker Nut Mfg. Corp.



With dial control of infinitely variable spindle speeds and turret tool feeds, this 1 5/8" Model AB Cleveland Single Spindle Automatic has increased production 500% on close tolerance machining of cold heading tools for Decker Nut Mfg. Corp. Typical tools are shown below. Shown at the machine are R. R. Hunt, foreman, and B. L. Konkle, operator and set-up man.



TOP—Long pierce punch (H. S. Steel) machined in 5 operations. Cleveland time: 20/hr. gross. Lathe time: 7/hr. gross.

BOTTOM—Short pierce punch (H. S. Steel) machined in 6 operations. Cleveland time: 17/hr. gross. Lathe time: 7/hr. gross.



Square die (High C-High Cr. Die Steel) machined in 7 operations. Cleveland time: 10/hr. gross. Lathe time: 22 min. each.



Nose die (Cr-W Tool Steel) machined in 7 operations. Cleveland time: 9/hr. gross. Lathe time: 25 min. each.

Let a Cleveland field engineer show you how *Cleveland's Cut Costs!* For machine specifications write for General Bulletin.

DECKER NUT MANUFACTURING CORP.
Manufacturers of
COLD HEADED INDUSTRIAL FASTENERS
Albion, Michigan

Cleveland Automatic Machine Company
Cincinnati, 12, Ohio

Gentlemen:—

Attention: Mr. Prohaska

The 1-5/8 Dialmatic which we purchased recently has resulted in substantial savings in our toolroom cost. These savings were realized immediately. There we had been using lathes to make tools for our cold-heading equipment we now use the Dialmatic completely.

The use of this machine has increased production of tools at least 500%. Coupled with the savings in time to practically nothing. This machine runs exclusively on tool steels at very close tolerances.

Our satisfaction with your equipment would not be complete without mentioning the fine cooperation that we receive from your sales and service people.

Should it be necessary to increase our facilities along this line, your equipment will most certainly be our choice.

Yours very truly,

DECKER NUT MANUFACTURING CORP.,

Edwin W. Konkle
Edwin W. Konkle
Pres. & Gen. Mgr.

ENK/CT

THE CLEVELAND AUTOMATIC MACHINE COMPANY

Manufacturers of a Complete Line of Single Spindle Automatic Screw Machines and High Pressure Hydraulic Die Casting Machines

Use postpaid card. Circle No. 205

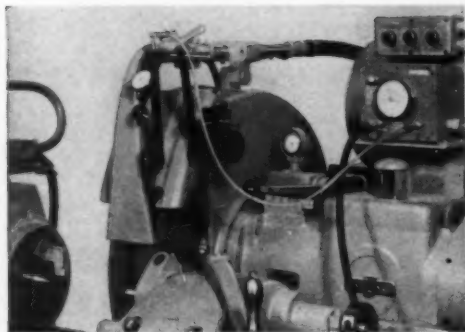
August, 1959

**4930 Beech Street
Cincinnati 12, Ohio**

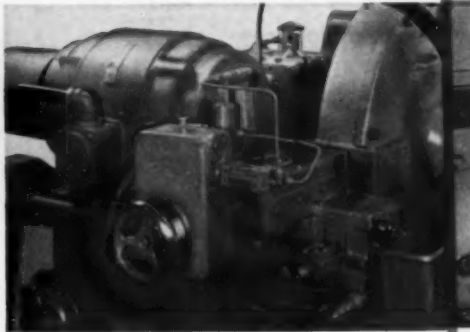
SALES OFFICES: CHICAGO
CLEVELAND • DETROIT
HARTFORD • S. ORANGE



* **These standard attachments increase**
grinding machine Accuracy
... Production
... Versatility



***Automatic Air-Electric Gage Sizing** ensures constant cycle time, and repetitive accuracy within minimum tolerances. Reduces operator responsibility, maintains high production rate.

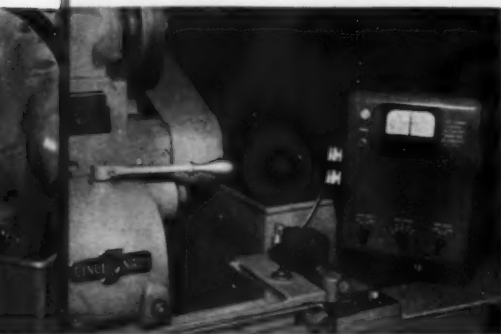


***Automatic Behind-the-Wheel Profile Truing.** For rapid, accurate truing of grinding wheel to correct profile. Increases wheel life, effects major savings in production costs.

PRECISION GRINDING MACHINES: CENTERTYPE • CENTERLESS • MICRO-CENTRIC • ROLL

Use of the proper Cincinnati Attachments can help you earn greater profits from your Cincinnati Grinding Machine investment. By more precise control of accuracy they end guesswork, save operator's time, speed production. These expertly designed attachments are available in a wide variety to perform scores of toolroom and production operations, making your Cincinnati Grinding Machines more versatile and reducing idle machine time.

Every shop has work that can be handled profitably on Cincinnati Grinders equipped with the appropriate attachments. Several examples are illustrated below, and many more are described in catalog G-701. May we send you a copy? Grinding Machine Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.



Grinding.
wheel
effects

***Gage Line.** An electronic taper correcting unit which replaces trial and error with amazing sureness and accuracy. Saves valuable production time, reduces costs.

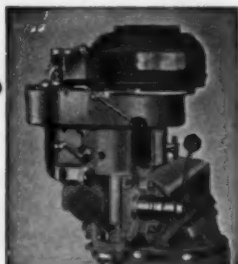


***Automatic Dual Rate Infeed.** Automatically provides rapid stock removal at start of cycle, then a slow feed for accuracy in sizing and surface finishing.



ROLL CHUCKING • CENTERLESS LAPPING





variable speeds 60 to 3300 r.p.m.



TREE 2UVR VERTICAL MILL

Spindle speeds infinitely variable from 60 to 3300 r.p.m. make the 2UVR Vertical Mill useful for a wide range of work not heretofore accomplished by mills of this size. Exclusive features include:

- Roller Spindle Drive
- Automatic Collet Closer
- Head to Ram Mounting
- Power Table Feed and Rapid Traverse
- Turret Locking Mechanism



For full information write,
TREE TOOL & DIE WORKS
1600 JUNCTION AVE., RACINE, WIS.

Use postpaid card. Circle No. 207

Quality . . . the best economy of all



He does a better job when he can see what he's doing

You increase operator efficiency as well as production when you use transparent, heavy-duty Sunicut cutting oils. Operators work better, because Sunicut oils let them see tools and workpieces, see the finish, see micrometer graduations.

Sunicut oils don't stain hands and clothing. They pump easily, wet metal fast, and give excellent extreme-pressure lubrication.

To prove to yourself the economy of Sun quality, ask your Sun representative to help you select the right

grade of Sunicut for your heavy-duty cutting requirements. Or write to SUN OIL COMPANY, Dept. MT-8, Philadelphia 3, Pa. In Canada: Sun Oil Company Limited, Toronto and Montreal.

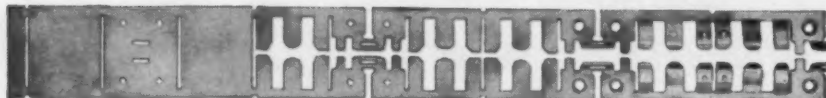


MAKERS OF FAMOUS CUSTOM-BLENDED BLUE SUNOCO GASOLINES

Use postpaid card. Circle No. 208



MANUFACTURER:
Harvey Hubbell, Inc., Bridgeport, Connecticut.
PRODUCT:
Contact Spring.
PRODUCTION:
136 Parts Per Minute.



Blanking, Piercing and Preforming in Press



Cutoff



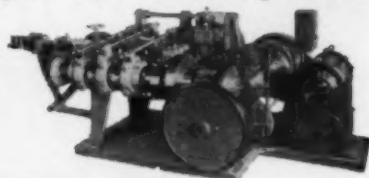
Partial Forming with Slides



Final Forming with Slides



*Nilson 4-Slide Machine
with Built-in Press*



NILSON 4-SLIDE BLANKS *and* FORMS IN ONE CYCLE!

Harvey Hubbell shifted production of this part from a conventional press and progressive dies to a Nilson 4-Slide with built-in press. The immediate results: elimination of two secondary operations... simpler die... higher production rate... no stripping problems.

Harvey Hubbell also found that vertical mounting of die makes replacement easy... permits automatic disposal of scrap by gravity. And maintenance costs are incred-

ibly low—this machine has been operating for twelve years without major repairs!

Nilson builds 7 models of ribbon metal forming machines, with built-in press sections ranging from 5 to 75 tons capacity. One of these machines may help you bring your stamping methods up-to-date!

Write today for the Nilson General Catalog on Automatic 4-Slide Equipment.



NILSON

THE A. H. NILSON MACHINE CO.

602 Bridgeport Avenue • Shelton, Conn.

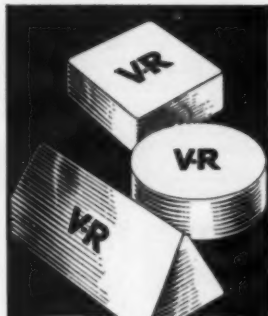
AUTOMATIC WIRE & RIBBON METAL FORMING 4-SLIDE MACHINES • WIRE & STOCK REELS • WIRE STRAIGHTENING EQUIPMENT • AUTOMATIC STAPLE FORMING MACHINES • SPECIAL WIRE FORMING EQUIPMENT

Use postpaid card. Circle No. 209

MACHINE and TOOL BLUE BOOK

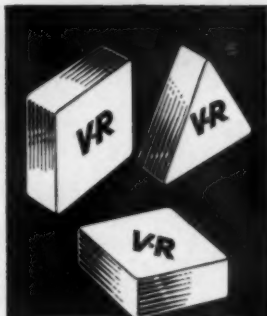
You wouldn't play right field
with a catcher's mitt . . .

playing ball or cutting steel,
use the "tool" designed for the job!



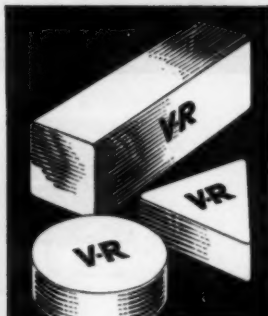
VR-77

for heavy roughing
and interrupted
cutting



VR-75

for medium
roughing and
general purpose
machining



VR-73

for finish machining
and light
roughing

Each carbide grade has been specially engineered and field proven for the correct balance of wear resistance, shock resistance and heat resistance to handle a specific range of operations. These superior V-R carbide grades cover the complete range of operations for machining all types of steel and the new superalloys . . . setting new standards of carbide tooling performance in hundreds of plants. V-R engineers will be glad to help you select the carbide grade engineered for your job. Contact your nearest V-R representative or write for complete information. Ask for Bulletin 5803 on V-R grades.



Vascoloy-Ramet corporation

C-744-S

August, 1959

846 Market Street • Waukegan, Illinois
Use postpaid card. Circle No. 210

ELLIPTICAL AND

produced on

Contour Control Cam

Eccentric
Cutter-Spindle Adapter

Cutter

Modified
Fellows
38-Type
Gear Shaper

THE
PRECISION
LINE

OVAL GEARS

Fellows 36-Type Gear Shaper



Now...you can generate accurate oval and elliptical gears, and other irregular shapes, rapidly and economically. Once setup is made, production is as simple as in cutting conventional cylindrical gears. This new method minimizes the difficulty of wide variations in backlash experienced with such gears cut by previous methods. Full or modified involute teeth are produced to a higher degree of accuracy than was ever possible before on gears of this type.

Oval and elliptical gears are produced by continuously varying the center distance between cutter and gear during the cutting operation. A contour cam (above) and a follower move the saddle the required amount in timed relationship with the rotation of the eccentric cutter-spindle adapter. The required pitch line contour of the gear is determined by the control cam and the eccentric adapter.

Although the Modified 36-Type Gear Shaper can be used to produce conventional external gears up to 18" pitch diameter by substituting a cylindrical cam and concentric cutter adapter, it is primarily a special purpose machine for oval and elliptical gears. Special stroke parts are required for cutting face widths from 6" to 10". For full information, get in touch with any Fellows office.

THE FELLOWS GEAR SHAPER COMPANY

78 River Street, Springfield, Vermont

Branch Offices: 1048 North Woodward Ave., Royal Oak, Mich.

150 West Pleasant Ave., Maywood, N. J.

5835 West North Avenue, Chicago 39

6214 West Manchester Ave., Los Angeles 45

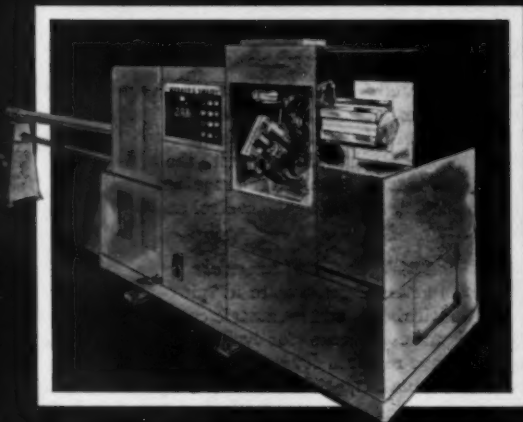
Fellows

Gear Production Equipment

Use postpaid card. Circle No. 212

NEW! WARNER & SPINDLE

...enables profitable small-lot production of even your most complex and precision demanding bar jobs on a fast, automatic basis



NOW, the shop-proven, cost-cutting features which have made Warner & Swasey Automatic Chuckers so outstanding in their field are available in a new Single Spindle Bar Automatic. Most important among the profit-producing features of this new Warner & Swasey 2 AB are:

- **FASTER SETUPS**—With no cams to change, time-consuming setup procedures, usually encountered with automatic bar machines, are eliminated. Even your smallest lot bar jobs can now be produced on an automatic basis economically.
- **GREATER ACCURACY**—only two wide—and widely-spaced—bearing surfaces support the turret. Thus, cumulative tolerance problems in conventional "multi-

ple bearing" turret location designs are eliminated.

- **EASIER TOOLING FOR COMPLEX WORK**—Flexibility and accessibility of the 2 AB's cross slides and pentagon turret enable the use of a wide variety of machining methods. One operation usually handles even the most complex workpieces.

- **POWER FOR TOMORROW'S JOBS—TODAY**—The 2 AB's 25 horsepower, reversible motor more than meets today's rugged metal removing requirements and, coupled with a wide range of spindle speeds, permits the efficient application of the latest cutting tool materials.

- **"FREE" CUT-OFF TIME**—An independently-operated cut-off slide allows full utilization of both front and rear cross slides. The cut-off cycle may be started during

SWASEY 2 AB SINGLE AUTOMATIC BAR MACHINE

This new 2 AB machine has a capacity of 3-inch diameter, 9½" working stroke and a 6-speed transmission that allows two ranges of 6 automatically-selected speeds: from 120-1544 RPM in High Range and 56-728 RPM in Low Range. Right or left-hand threads can be handled from 7 to 32 TPI.



Sets up fast...like a turret lathe

any one of the pentagon turret stations. Thus, cut-off can be progressing during subsequent machining providing a cut-off cycle which is virtually "free".

● **AUTOMATIC RESTOCKING INDICATOR**—This ingenious device in the hydraulic bar feed mechanism automatically stops the 2 AB and lights an indicator light on the operator's control panel before the bar being machined runs out—prevents tool damage from improperly-gripped stock.

Why not call your nearest Warner & Swasey Field Representative and get the complete story on the new 2 AB. It can help increase both production and overall profits—so important in today's highly competitive picture.

Use postpaid card. Circle No. 213



NO MATTER WHICH WAY YOU TURN
...WARNER & SWASEY CUTS COSTS



new

*Most
Productive
and
Versatile
Drill-Point
Grinder
Ever
Designed*



MORSE

Production

DRILL-POINT GRINDER

*Now . . . you can accurately grind points on
a profitable, high-production basis.*

This new machine, conceived and built by Morse . . . has been thoroughly job-proved in the Morse plant. In fact, this one compact unit, with its attachments, will grind the following points . . .



CONVENTIONAL

HELI-CENTRIC



and **SPLIT POINT...**
(CRANKSHAFT)

on a high-precision, high-production basis. No other machine can match this performance.



*For complete details,
write for new illustrated bulletin.*

MORSE TWIST DRILL & MACHINE CO., NEW BEDFORD, MASS.

Warehouses in New York, Chicago, Detroit, Dallas, San Francisco.

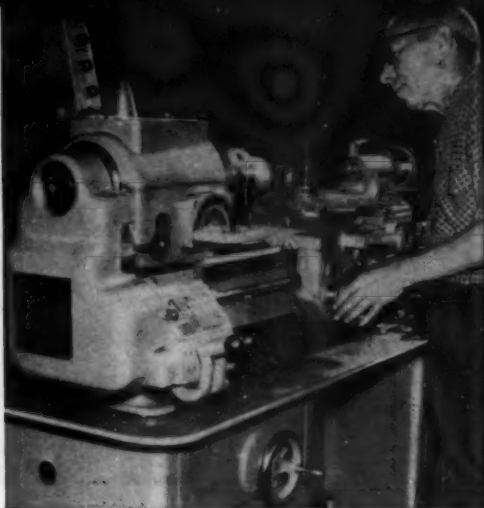


A division of Van Norman Industries, Inc.

MORSE means "THE MOST"
in Cutting Tools



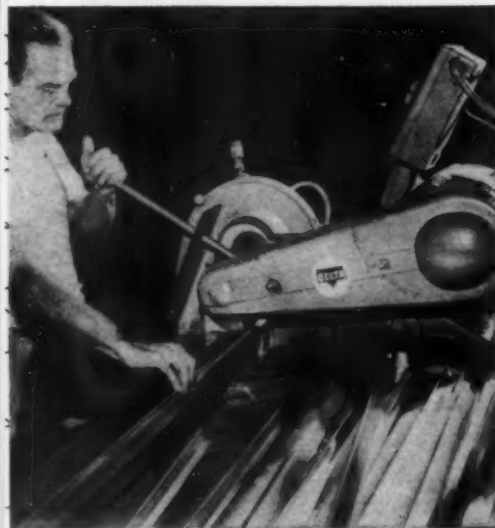
20" Drill Presses, 28 Models



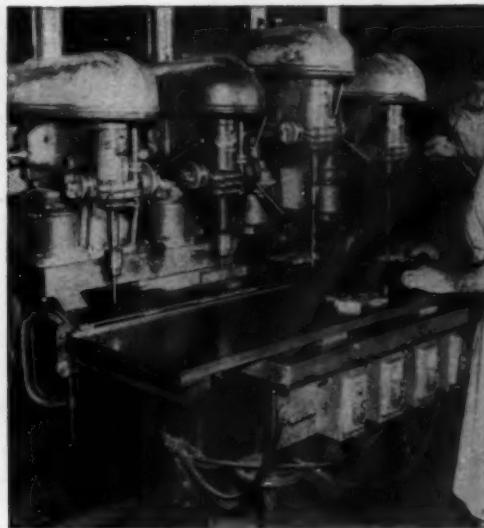
11" Metal Lathes, also 10" (4' and 5' Bed)

ON ANY SIZE JOB

DELTA INDUSTRIAL TOOLS P



Cut-off Machines, Wet & Dry Abrasive,
Non-Ferrous and Wood



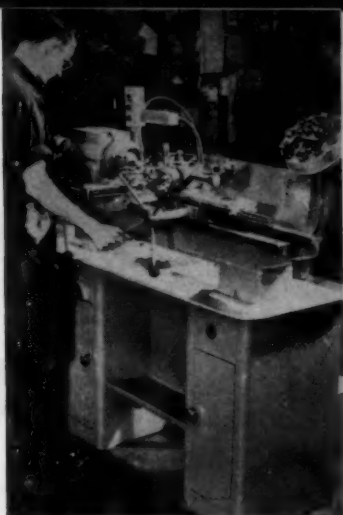
17" Drill Presses, 76 Models



20" Band Saws, also 14"

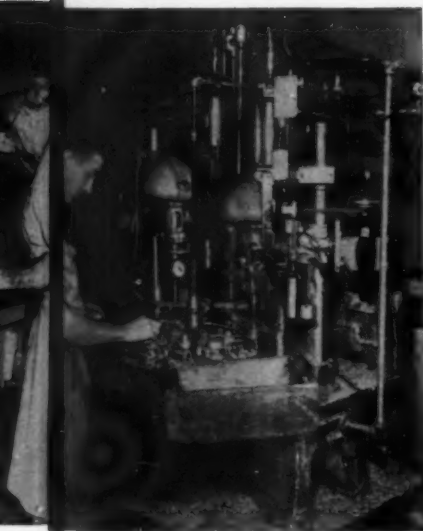


Toolmaker® Grinders, also 6" and 7"



Hand Screw Machines

S PAY THEIR OWN WAY



14" Drill Presses, also 14"
Super-Hi Sensitive and 15"

You'll save money three ways when you put Delta Tools to work in your shop: they cost less to buy, less to operate, and less to maintain. They're ruggedly built to withstand hard wear, yet are completely mobile—offer you precision to meet the most exacting requirements.

And versatile Delta Tools can be "teamed-up" with standard automatic control devices to provide really "lo-cost" automation. Now any size plant can have the benefits of automation at a fraction of the usual investment.

Write for FREE Delta Industrial Catalog. Rockwell Manufacturing Company, Delta Power Tool Division, 610H N. Lexington Ave., Pittsburgh 8, Pa.

See Delta Industrial Tools at your nearest Delta Dealer . . . he's listed under "TOOLS" in the Yellow Pages.

DELTA INDUSTRIAL TOOLS

another fine product by

ROCKWELL



FORTUNA

alloy steel



A further production unit having been completed at Dillenburg, the Stahlwerke Südwestfalen AG., Geisweid, Western Germany, now operate five modern alloy steel plants, and have thus strengthened their position among the large European manufacturers of special steels.

FORTUNA alloy steels for the general engineering, automobile, aircraft and chemical industries, for tool manufacturers, plastics processors and other special applications, are now available in an exceptionally wide range of shapes and sizes on the American market.

F O R T U N A stainless and heat-resisting steels

F O R T U N A alloyed constructional steels

F O R T U N A tool and high-speed steels

Machined and unmachined forgings and drop stampings for all duties and applications. Drawn wire of Thomas and open-hearth steel, of all gauges.

Specialities: piano and spring steel wire etc. Wire products of all kinds.

For further particulars and price lists please apply to our Subsidiary Company and Sole Export Organization.

ROBERT ZAPP-FORTUNA GMBH.

DUSSELDORF / WESTERN GERMANY



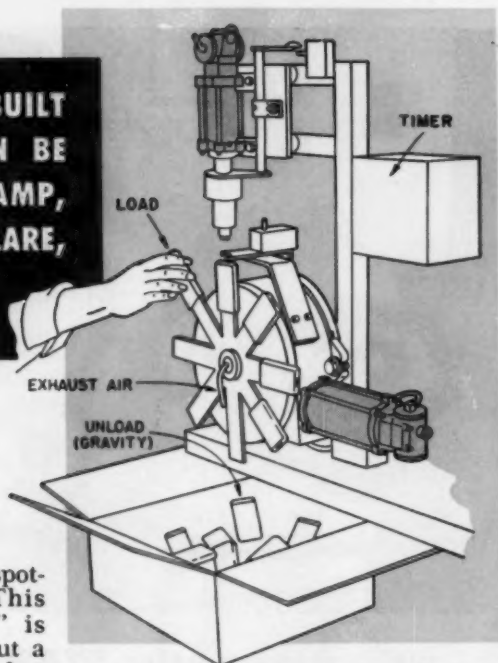
Use postpaid card. Circle No. 216

MACHINE and TOOL BLUE BOOK

**THIS SIMPLE SHOP-BUILT
"FERRIS-WHEEL" CAN BE
USED TO PUNCH, STAMP,
HEAT-SEAL...OR TO FLARE,
FORM OR RIVET**

Here's another example how versatile Bellows "Controlled - Air - Power" Devices can be used to "spot-automate" operations. This "SPOT-A-MATION IDEA" is based on a setup used to cut a slot in a plastic key case, but the basic idea can be adapted to perform a host of operations in metal fabrication.

It's a simple, inexpensive device. A Bellows Rotary Feed Table, mounted vertically, feeds the part to the tool attached to the piston rod of the Bellows Air Motor. The two are electrically interlocked. Bellows Rotary Feed Tables can be provided to index



almost any number of positions. The unit can be equipped with a "timed dwell"; additional work stations can be set up to perform other operations on the same part; automatic feeding or ejecting devices could be installed.

Whatever you make, however you make it, Bellows "Controlled-Air-Power" Devices can help you make it at lower cost.

**THIS SPOT-A-MATION
IDEA FILE IS
YOURS ON REQUEST**

Complete wiring diagrams, installation data and equipment list on the "ferris-wheel" shown, and on a score of other applications where Bellows air-powered work units are used to convert existing equipment to lower cost operation. Write for it today. Address: Dept. MTB-859, The Bellows Co., Akron 9, Ohio.

1341-B

OTHER INDUSTRIAL DIVISIONS OF
IBEC: Sinclair-Collins Valve Co.,
Valvair, Akron, Ohio • V. D.
Anderson Co., Cleveland, Ohio

The Bellows Co.

DIVISION OF INTERNATIONAL BASIC ECONOMY CORPORATION (IBEC)
AKRON 9, OHIO



**"...WE ALWAYS SPECIFY STAR BLADES
FOR FASTER CUTTING"**

Your production manager may not have actually had a hack saw blade or a band saw blade in his hands for years. But he's well-acquainted with the mathematics of metal cutting. Output is his specialty...and the record shows that Star blades can help step it up.

The steel in Star hack saw blades is the finest. Specially designed equipment forms sharp cutting teeth to shape and size...assures uniform set and temper of teeth throughout. The wide Star line provides the right blade to do each cutting job efficiently and economically.

Your nearby Star Distributor can help you pick the right hack saw or band saw blade according to the requirements of the job. You'll find him to be a good man to know when you're faced with a metal cutting problem. He can be of real assistance to you.

Free literature — The Star Metal Cutting Wall Chart and the Star Metal Cutting Guidebook have been put together to help you run a more efficient metal cutting shop. They list all the types and sizes of hack saw and band saw blades, help your men pick the best one for the job. Write for your free copies of both.

© 2054



STAR

Band Saw Blades

In revolutionary
new Reel-Pac Dispenser

— in sizes up to and including 1" — the convenient way to store and handle band saw blades. User simply slides out and cuts length needed. Excess goes easily back into Reel-Pac.

Star makes a full line of Power Hack Saw Blades, Band Saw Blades and Hand Hack Saw Blades and Frames — one for any metal cutting need.



STAR HACK SAW and BAND BLADES

Manufactured by CLEMON BROS., Inc.

Middletown, N.Y., U.S.A.

Warehouses in Brooklyn • Chicago • Denver • Houston • Los Angeles • Newark • New York City • Portland, Ore.

Makers of Hand and Power Hack Saw Blades, Frames, Metal and Wood Cutting Band Saw Blades and Clemson Lawn Machines

Use postpaid card. Circle No. 218

What do you want in an inclinable?

AIR FRICTION CLUTCH? MECHANICAL CLUTCH?
FLYWHEEL OR GEARED PRESS?
SINGLE OR DOUBLE CRANK? AUTOMATIC FEEDS?
10 TON...200 TON?

Don't settle for "second-best" when the best may cost you less! Chances are whatever your needs in an inclinable, it's a Bliss standard—simply because Bliss makes more types and sizes of inclinable presses than any other builder. In fact, someone else's "special" may be a Bliss standard. Check it out for yourself before you buy—write for our most recent inclinable catalogs and data sheets. You'll see that size for size, no matter what you want in an inclinable, you get more press from Bliss... large crankpins, long strokes, greater openings, bigger beds and many other extra values. A press that's backed by a century of press engineering... by competent counsel... by a **dependable** parts and service program. In short, you'd be wise to check Bliss—first!

E. W. BLISS COMPANY
Canton, Ohio

BLISS
SINCE 1857

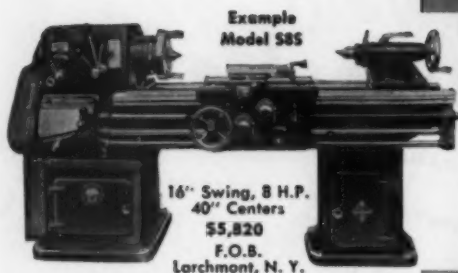
*Bliss is more than a name...
it's a guarantee!*

PRESSES • ROLLING MILLS • ROLLS
DIE SETS • CAN MACHINERY • CONTRACT MANUFACTURING

Use postpaid card. Circle No. 219

August, 1959





16" Swing, 8 H.P.
40" Centers
\$5,820
F.O.B.
Larchmont, N. Y.

Weight 4800 lbs.
Spindle Speeds 18
Feeds & Threads 76
Spindle Bore 2 3/4"

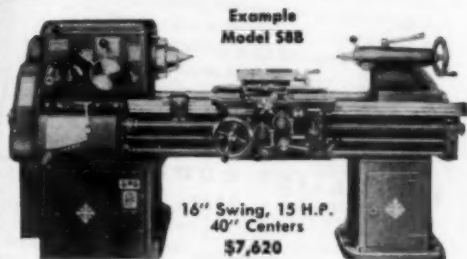
Flame Hardened Bedways Optional

Superb
Swedish
Engineering
KOPING
LATHES
Realistically
Priced
Heavy Duty
Large Spindle Bore
Swings From 16" to 60"

For years successful manufacturers have turned out better products with KOPING Machine Tools, which owe so much to the outstanding Swedish materials from which they are made. They know that the KOPING nameplate is not just another trademark, but is also a criterion of quality, top design and good service. KOPING has been making machine tools for more than 100 years. This continuity of service is our inspiration today as we build a bigger future for KOPING products.

Weight 6100 lbs.
Spindle Speeds 18
Feeds & Threads 271
Spindle Bore 2 3/4"

Flame Hardened Bedways Standard



16" Swing, 15 H.P.
40" Centers
\$7,620
F.O.B.
Larchmont, N. Y.



MEKANISKA
VERKSTADS AB
KOPING • SWEDEN

Homestrand, inc.

Our representative in USA:
9 ADDISON STREET, LARCHMONT, NEW YORK



Another member of
the VOLVO Family

JOHANSSON GAGING EQUIPMENT

**Assures You
Precision to the
Finest Degree
to Meet Your
Requirements
—Backed by the
Name Supreme
in the World of
Measurement**

GAGE BLOCKS

(JOHANSSON) and accessories. Short deliveries. Inspection and reconditioning service available at our plant.

INTERNAL INDICATORS

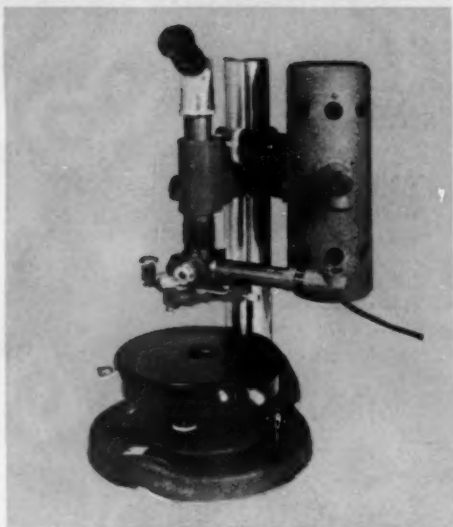
(for inside measurements .155 to 24 inches). Scale range plus or minus .001 graduated to .0001 and minus .020 graduated to .0001.

MIKROKATOR

(Amplifier—for outside measurements) Graduations .0001 to .000001 or .01M to .0002M.

OTHER JOHANSSON PRODUCTS

Micrometers, Snap Gages, Extensometers, Dynamometers, Hardness Testers, Surface Finish Indicators, Interferometers, Plugs, Rings and Special Gages.



MULTIMI

Multiple Interference Microscope

The Multimi is an instrument for both scientific and practical measurements through which the possibility has been given to everyone to make use of the great advantages of the interference methods. The accuracy of the Multimi is as high as .04 micro inches, which means an accuracy of about the same value as the atomic dimensions. The fringes are here replaced by what can be classified as lines which constitute real profile curves and contours, exactly reproducing surface shapes of different kinds. The instrument is adapted for photographing the interferogram by a miniature camera. Low reflecting, normal reflecting and high reflecting interference plates are available. It is highly recommended for the following: Surface finish measurements . . . surface finish on quartz plates . . . thickness of films and coatings . . . thermal and mechanical deformations . . . cell research, etc.

Write for Literature

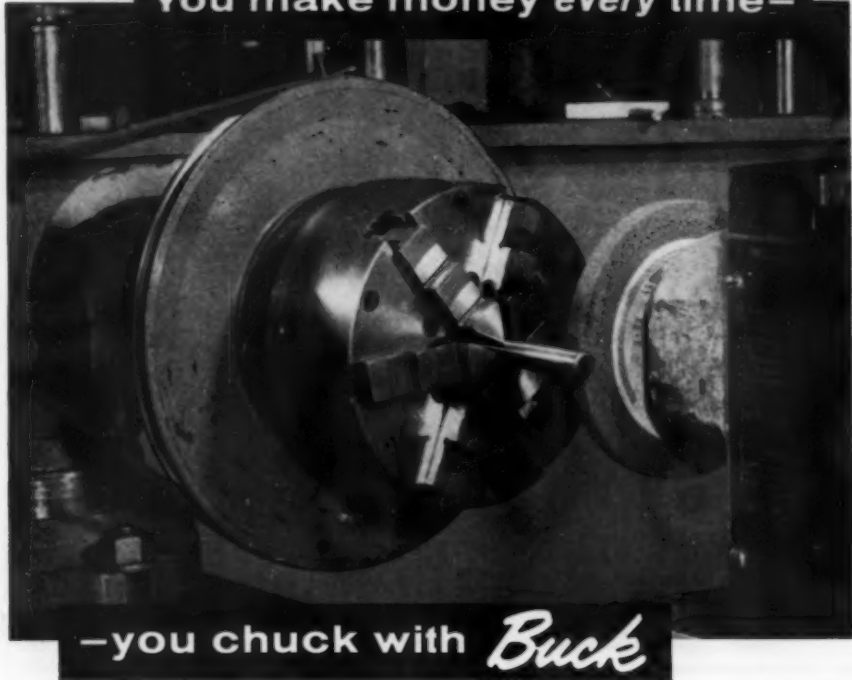
C. E. JOHANSSON GAGE CO.

A DIVISION OF SWEDISH GAGE CO.

10641 HAGGERTY AVE. • BOX 4086 NORTHEASTERN STATION • DEARBORN 1, MICH.

Use postpaid card. Circle No. 221

You make money every time—



—you chuck with *Buck*

Here's why:

You can *always* secure *dead* true precision on single parts—and machine within .0005" on duplicate parts without chuck adjustment. (Compare that with conventional chucks that are only accurate to .003" *when new*.)

You save costly machinists' time each chucking. Takes but a minute to indicate and adjust a Buck. No shims needed. Even inexperienced operators

can do precision work thanks to the exclusive Buck Adjust-Tru® features.

Buck chucks give you more precise work with new machine tools, or compensate for spindle run-out to prolong old machine usefulness. And the Adjust-Tru operating principle takes up normal internal chuck wear.

You get all those Buck *plus* features at no additional cost. Send for catalog—see why "It pays to chuck with Buck" today.

Makers of Scroll, Power,
Dust Proof, Independent
Chucks.

BUCK TOOL COMPANY

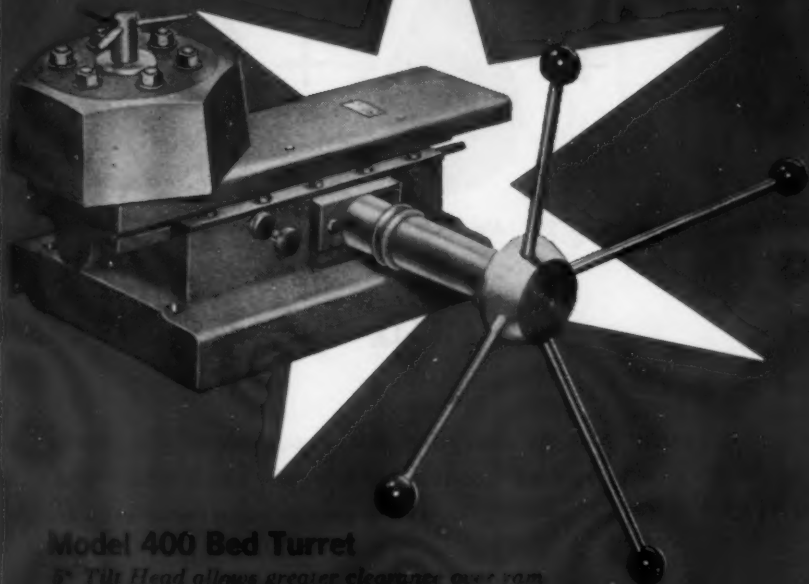
812 SCHIPPERS LANE • KALAMAZOO, MICHIGAN

Use postpaid card. Circle No. 222

MACHINE and TOOL BLUE BOOK

AK

BED TURRETS ...for Engine Lathes



Model 400 Bed Turret

5° Tilt Head allows greater clearance over ram

Convert your engine lathe for ram-type turret lathe production with an AK Bed Turret. Self-indexing, six station heavy duty bed turret, allows full turret type operation on spindle fed bar stock. Or, turret may be used for one or more operations on individually chucked parts.

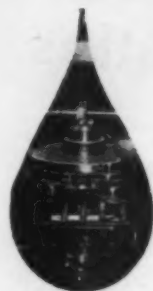
Write for price list and catalog information concerning the correct model AK Bed Turret for your lathe and production requirements.

PRECISION PROCESSING CO.

3260 Cactus Avenue
Los Angeles 39, California

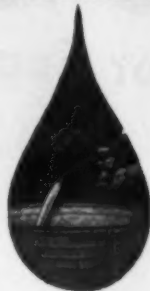
Use postpaid card. Circle No. 223

"Summer Odor" from



SOLUBLE OIL

+



WATER

+



PSEUDOMONADS

...can be controlled

Nearly everyone has experienced the "rotten egg" smell of spoiled soluble oil emulsions. Here's what causes it . . . and how you can control it with Elcide 75.

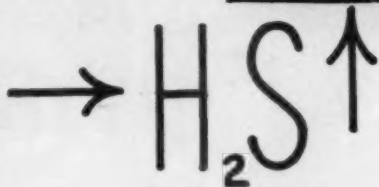
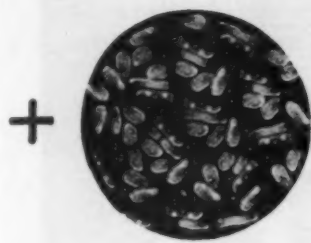
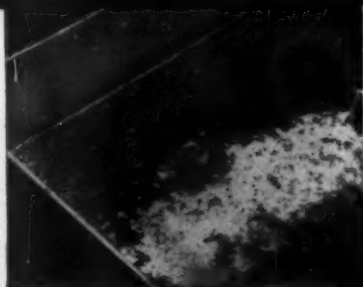
THE CAUSE: The oil-and-water mixture of a standard-duty soluble oil emulsion produces ideal feeding conditions for certain bacteria. One of the most common types, *pseudomonads*, can be found in all emulsions. Once established, they multiply rapidly . . . especially in warm weather . . . and feed on the emulsion.

As these pseudomonad colonies build up, they set the stage for a secondary contamination by sulfate-reducing bacteria. These bacteria feed on the petroleum sulfonates commonly used

as the emulsifying agent in soluble oils. As they multiply, they throw off H_2S , the hydrogen sulfide gas known in the industry as "summer odor."

Unfortunately, the damage from bacterial contamination does not end here. As the odor develops, the bacteria continue feeding on the emulsifier until the emulsion breaks. This process changes the mixture from alkaline in composition to corrosive acid. Other by-products from the bacteria form a slime that clogs screens and filters, and presents certain hygienic hazards.

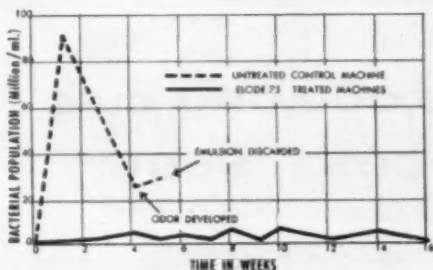
rancid emulsions



SULFATE REDUCING
BACTERIA

(SUMMER ODOR)

with ELCIDE 75



This plant-test record shows bacterial build-up in an untreated emulsion. The downward curve is where secondary contamination by the sulfate-reducing bacteria starts final destruction. The Elcide 75-treated emulsion lasted 5½ times longer.

THE CURE: ELCIDE 75 hits this problem at the first stage of bacterial growth. Because Elcide 75 is a new, wide-spectrum inhibitor, it attacks and controls a wider range of bacteria, and the mutants which frequently develop. Just one ounce of Elcide 75 in

each 4 gallons of fresh emulsion breaks the vicious cycle of bacterial growth before it starts . . . thereby greatly extending the life of your coolant.

ELCIDE 75 is a reliable way to prevent the waste of frequent emulsion changes. Its wide range of anti-bacterial action insures a constant control that not only prevents "summer odor," but also reduces production costs. Many plants have thoroughly tested Elcide 75. They found Elcide 75-treated emulsions last far longer, reduce downtime and oil concentrate costs, and increase total productivity.

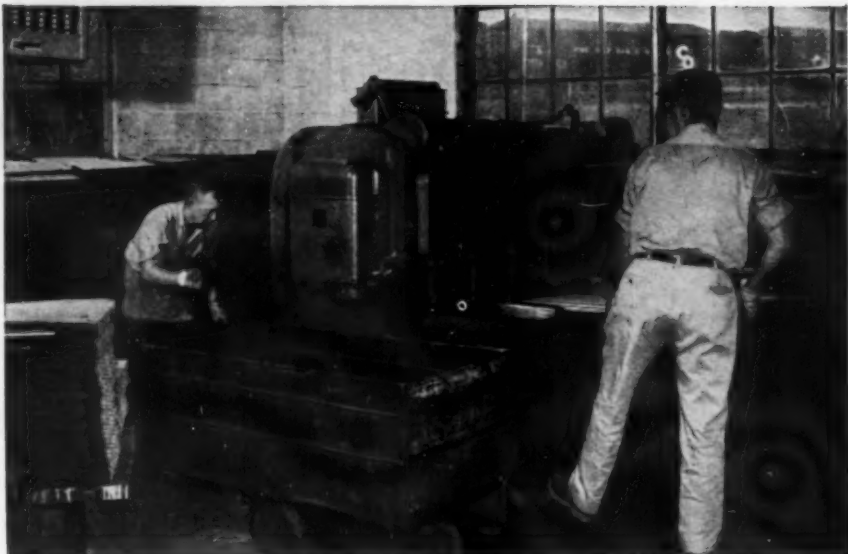
If you have not yet tried Elcide 75 in your plant, we urge you to try it now . . . before the heat of summer further inflates your personnel problems and operating expenses.



ELCIDE 75TM
PATENT PENDING

KEEPS COOLANTS FRESH AS A DAISY!

INDIANAPOLIS 6, INDIANA
TELEPHONE: MELROSE 6-2211



PRODUCTION: 10,000,000 cuts
MAINTENANCE COST: \$896⁰⁰

This Cincinnati® Shear has been in constant service for ten years, cutting 18-gauge corrugated sheet, 1010 draw quality, for a prominent heating equipment manufacturer at an average rate of 4000 cuts a day. That adds up to more than a million strokes per year—or 10,000,000 strokes in ten years.

Accuracy has always been excellent. The machine has been "down" only for blade changes. Special blades are used in this operation, to eliminate distortion of the corrugations.

Cost of machine maintenance, including blade resharpening, has been \$896.00 for the entire ten years. "This," says their production manager, "to my way of thinking, is very good performance." We agree. Yet this is not exceptional. Every Cincinnati® Shear is built to provide this kind of dependability and low maintenance, and we have hundreds of case histories to prove the point.

Specify Cincinnati® for all your shear requirements. Write Department H for Catalog S-7R.

Shapers / Shears / Press Brakes

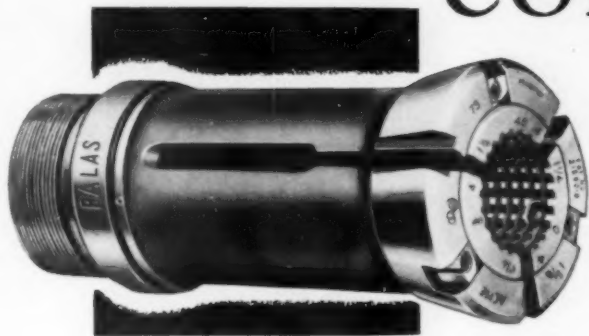
THE CINCINNATI
SHAPER CO.



Cincinnati 11, Ohio, U.S.A.

Use postpaid card. Circle No. 225

DURABLE
VERSATILE
ECONOMICAL
BALAS
MASTER
COLLETS



You can always depend on Balas Martin Master Collets even when working under the roughest, toughest conditions. They are expertly engineered and ruggedly built to last for years.

Balas Master Collets and assorted sets of pads enable you to make use of the full capacity of your automatics. The pads are front loading to save hours of set-up time.

Precision made Balas Master Collets not only provide extraordinary service but we guarantee that they must satisfy you.

Collets and pushers in popular sizes for most machines are carried in stock for immediate delivery. Write for price list and catalog.



BALAS COLLET MANUFACTURING CO.

CLEVELAND 14, OHIO

Save Hours in tool rooms and die shops with **CONTOUR SAWING AND FILING**



You can save real time and money in the production of parts for jigs and fixtures, dies, gages, templates and special machine production by using an Oliver of Adrian contour sawing and filing machine.

The Oliver is so simple to operate that all sawing, filing and lapping can be handled by an ordinary mechanic—saving a skilled die maker's costly time. Parts can be shaped to dimension faster, more accurately with no hand filing or semi-finishing operations. Available in five types — bench or pedestal. Write today.

OLIVER of ADRIAN
OLIVER INSTRUMENT COMPANY

1408 E. Maumee St. • Adrian, Michigan

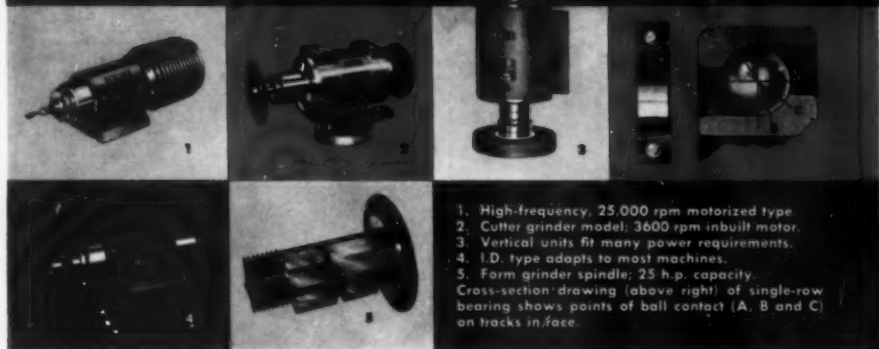


Use postpaid card. Circle No. 1b

EX-CELL-O SPINDLES

EX-CELL-O

RUN TRUE



1. High-frequency, 25 000 rpm motorized type
 2. Cutter grinder model; 3600 rpm inbuilt motor.
 3. Vertical units fit many power requirements.
 4. I.D. type adapts to most machines.
 5. Form grinder spindle; 25 h.p. capacity.
- Cross-section drawing (above right) of single-row bearing shows points of ball contact (A, B and C) on tracks in face.

50-26

EXCLUSIVE RADIAL THRUST BEARING DESIGN PUTS PRECISION INTO PRODUCTION GRINDING

What makes Ex-Cell-O Precision Grinding Spindles run true? Engineering experience, skill in precision production and assembly, quality materials—and perhaps most important, the famous Ex-Cell-O Precision Spindle Bearing!

Made by Ex-Cell-O for use only in Ex-Cell-O Spindles, this custom-made bearing is the product of a unique Ex-Cell-O process which develops tracks or pathways in the race. The ball contacts the race only at these narrow, mirror-smooth bands (see detail above).

As a result, the bearing runs cooler at high speeds; wear is reduced, rigidity is improved, and spindle accuracy is measurably increased.

In widespread original equipment use, Ex-Cell-O Spindles are also an economical means of increasing

speed and accuracy in older I.D. or O.D. surface and thread grinders, tool and gear grinders and similar equipment.

See your Ex-Cell-O Representative, or write direct for details on the complete line of Ex-Cell-O Precision Grinding and Boring Spindles.

EX-CELL-O FOR PRECISION

EX-CELL-O Machinery Division
CORPORATION
DETROIT 32, MICHIGAN

EX-CELL-O PRECISION PRODUCTS INCLUDE: MACHINE TOOLS • GRINDING AND BORING SPINDLES • CUTTING TOOLS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • TORQUE ACTUATORS • THREAD AND DRIVE GAGES • GRAPHIC SURFACE PLATES • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAILY EQUIPMENT

Use postpaid card. Circle No. 233



Literature, just off the press, covers features and specifications.

See our catalog in Sweets

PORTAGE...3" diameter horizontal milling, drilling and boring machine

Mr. Buyer...here's a 3 inch bar machine you can't afford not to investigate. It's new from the top of the column to the bottom of the base...All new speeds and feeds, plus a versatility of job applications make it a real money maker. All new construction features offer a truly strong, rugged machine...and the pay-off... it's priced amazingly low, every shop can afford one ...write, wire or phone for complete information.

THE PORTAGE MACHINE COMPANY



1025 SWEITZER AVE., AKRON 11, OHIO
PORTAGE 2-0211 TWX AK266

BUILDERS OF PRECISION MACHINE TOOLS, SPECIAL AND PRODUCTION MACHINERY SINCE 1916

Use postpaid card. Circle No. 234

MACHINE and TOOL BLUE BOOK

going places...

Designed to handle heavy duty applications, CIMPERIAL is the new chemical cutting fluid that has already won nation-wide acceptance. Wherever used, CIMPERIAL scores new production records, particularly on low clearance, low speed, heavy cut jobs—previously limited to cutting oils.

SALES REPORT

2.
a sub-contract making cone exits for missiles.

A 17-inch pass to bore a taper inside the cone (normalized 4130 steel). 5/8" of metal to be removed.

With the former coolant it took 7 passes and they needed a new tool bit each time.

They put in Cimperial (at 1:15 dilution). Now it takes only 3 passes—all with the same tool.

Work piece is much cooler, even with bigger cut. Chatter eliminated entirely. Production more than doubled and tools last 7 times as long, with Cimperial. It really pulled them* out of a hole on deliveries.

Bill Crawford
Los Angeles Office

*Firm name available on request.



CIMCOOL
Cutting Fluids

FOR 100% OF ALL METAL CUTTING JOBS
Production-proved products of The Cincinnati Milling Machine Co.

CIMPERIAL—newest in the famous, industry-proven line of Cimcool® Cutting Fluids!
CIMCOOL 52 Concentrate—The pink fluid which covers 85% of all metal cutting jobs.
CIMPLUS—The transparent grinding fluid which provides exceptional rust control.
CIMCUT Concentrates (AA, NC, SS)—For every job requiring an oil-base cutting fluid.
ALSO—CIMCOOL Tapping Compound—CIMCOOL Bactericide—CIMCOOL Machine Cleaner.

For full information on the complete family of CIMCOOL Cutting Fluids, call your CIMCOOL Distributor. Or contact Cincinnati Milling Products Division, Cincinnati 9, Ohio.

*Trade Mark Reg. U.S. Pat. Off.

Allen Hughes

cut abrasive costs 18 to 1 at

Grinding the gripper-die marks off a jet turbine blade can be an expensive business. At the Harrisburg Works of Thompson Ramo Wooldridge, these super-alloy steel blades used to be semi-finished with coated abrasive belts until Industrial and Abrasive Control Engineer Paul Mazich started checking up on costs.

Mazich called in Bay State Abrasive Engineer Allen B. Hughes and he dug into the problem. Working with Bay State distributor General Machinery & Equipment Company, Hughes made a series of careful tests. The result was a grinding wheel that cut the annual cost of abrasive materials

alone from \$18,000 to \$1,000. Its unique combination of special bond and abrasive grit increased cutting speed, prevented loading and eliminated the need for dressing so successfully that productivity rose, labor costs dropped and there were additional savings of around \$5,000.

Like Allen Hughes, the Bay State Abrasive Engineer in your area is a trained expert. He backs up the work of the experienced men who represent Bay State's topflight distributors and Bay State's research labs back them both with new ideas, techniques and materials. *Better grinding at lower cost . . . that is our business.*



Industrial Engineer Paul Mazich examines finish on jet engine blade forging after off-hand grinding operation illustrated at right.



Operator E. S. Jones semi-finishes jet turbine blade in off-hand grinding operation with cool-cutting, self-dressing Bay State grinding wheel.

Thompson Ramo Wooldridge



Allen B. Hughes worked up through Bay State's Westboro plant and then added extensive field experience so that his knowledge of abrasive problems and practical solutions for them covers every phase of abrasive engineering.

BAY STATE ABRASIVES



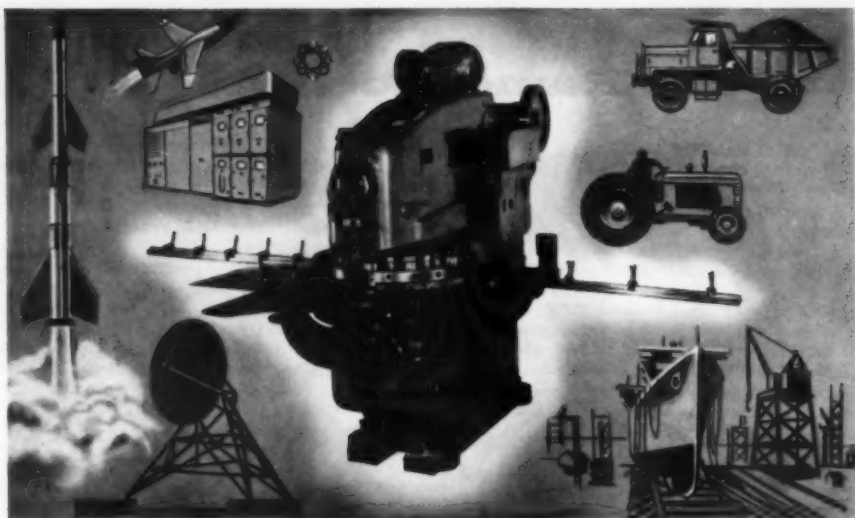
Bay State Abrasive Products Co., Westboro, Massachusetts.

In Canada: Bay State Abrasive Products Co., (Canada) Ltd., Brantford, Ontario.

Branch Offices: Bristol, Conn., Chicago, Cleveland, Detroit, Pittsburgh, Los Angeles. Distributors: All principal cities.

Use postpaid card. Circle No. 237

August, 1959



WIEDEMANN PIERCES THE TIME AND COST BARRIER

Wherever openings must be produced in sheet metal or plate . . . and quantities range from one to hundreds of a kind. Wiedemann Turret Punch Presses are paying big dividends throughout industry. Direct savings of 60% to 90% are commonplace—here's why:

the WIEDEMANN METHOD

... Eliminates These Costly Factors

- layout and setup
- burning, drilling, nibbling, fly cutting, etc.
- deburring and cleaning
- die sets and multiple tool setups

... Gives you the unmatched Speed and Flexibility of a Turret Punch Press

- Locates and produces openings accurately at low cost.
- All tools in turrets ready for use.
- Only one punch and die of a size required.
- Engineering changes made on-the-spot.
- Parts produced as required in minutes.
- Simplifies design, engineering and production.
- Pays for itself with savings in two years or less.



RA-41P Wiedemann
15-ton capacity
28" throat depth

Other models from 4 to 150 tons

Take a closer look at your "hole" cost situation in terms of the Wiedemann Method. Send drawings of your work for time study and write for Bulletin 301.

WIEDEMANN
MACHINE COMPANY
TURRET PUNCH PRESSES

DEPT. MT-8 • GULPH ROAD • KING OF PRUSSIA, PA.

Use postpaid card. Circle No. 238

MACHINE and TOOL BLUE BOOK



M&M blades assure **less cost per cut**

MOTCH & MERRYWEATHER offers every user of slitting, slotting and cut-off blades three outstanding cost-saving advantages.

First, M&M's Triple Chip sawing method enables you to take "bigger bites" at higher speeds. Distributing cutting strain evenly, it greatly lengthens tool life.

Second, factory repair, resharpening and resegmenting service, the fastest in the industry, minimizes costly downtime . . . reduces your investment in inventory.

Third, Motch & Merryweather manufactures a complete line of cutting blades to meet every circular sawing requirement. Buying all your blades from a single source—your local M&M dealer—saves valuable purchasing manhours, assures consistently high quality blades. Call him today.



FREE—Send today for your copy of M&M's Circular Sawing Handbook, a pocket-sized guide to sawing operations.



Cutting Tool Manufacturing Division
Cleveland 17, Ohio

TAPER SHANK RIPPING PUNCH LATTICE BAR PUNCH TENON PUNCH POWER PUNCH HAND SCREW PUNCH STRAIGHT SHANK

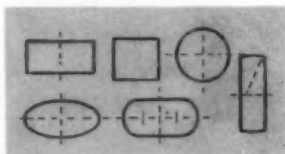


Cut Costs • Speed Production Specify **CLEVELAND** STANDARD • SPECIAL **PUNCHES and DIES**



From the smallest
to the LARGEST!
PROMPT DELIVERY

Save on inventory! 400 sizes of 21 standard punches ready for prompt shipment from stock. Save time! Save money!



Special Punches and Dies

For any of these shapes or for your particular requirements, simply send us your sketch with principal dimensions. You'll be pleased with our prompt delivery.

Write for CLEVELAND's
Punch and Die
Handbook No. 12.



Here's **WHY** You Save Money
Using **CLEVELAND** Punches

Cut Tool Set-Up Time!

Only with CLEVELAND punches and dies can you punch ANY size hole from 1/8" to 1 1/4" with the SAME coupling nut and punch stem! No buttons, no filler blocks, no make-shifts necessary!



Less Down-Time! Cleveland punches are interchangeable—quick and easy to insert or remove.

Last Longer! Punch or notch sheets, strip, angles, channels or extrusions—you'll find CLEVELAND punches and dies are tough, long-lasting, made to stand up under most severe usage.

Pay LESS for Cleveland punches—made in quantity, no stock wasted.


A-200-A

The **CLEVELAND** PUNCH & SHEAR WORKS CO.

East 40th and St. Clair Avenue • Cleveland 14, Ohio

**Power Presses • Punching Tools and Dies
Plate and Structural Steel Fabricating Tools**

Use postpaid card. Circle No. 240



*the master mechanic's way
with oilstones*

deburring . . .

• whether deburring and honing small knife blades for hand cutters, or chamfering and fitting close tolerance dies . . .

hand stoning is the better way for precision work, for better cutting edges, for higher quality finishes, and for longer tool life. Send for your free copy of the Hand Stoning Handbook to Dept. BB-8.

BEHR-MANNING CO.

TROY, NEW YORK
A DIVISION OF NORTON COMPANY



BEHR-MANNING PRODUCTS: Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes
NORTON PRODUCTS: Abrasives • Grinding Wheels • Grinding Machines • Refractories • Electrochemicals





**any size
or shape**



Whatever the size or shape of the bend for your pipe, tube or structural metal part, a PEDRICK PRODUCTION BENDER can do the job fast, accurately and economically. Let us demonstrate. Write PEDRICK TOOL AND MACHINE Co., 3640 N. Lawrence St., Philadelphia 40, Pa. Dept. 3.

*Free "Pedrick Line" Bulletin.
Write today.*

**PEDRICK
PRODUCTION BENDERS**

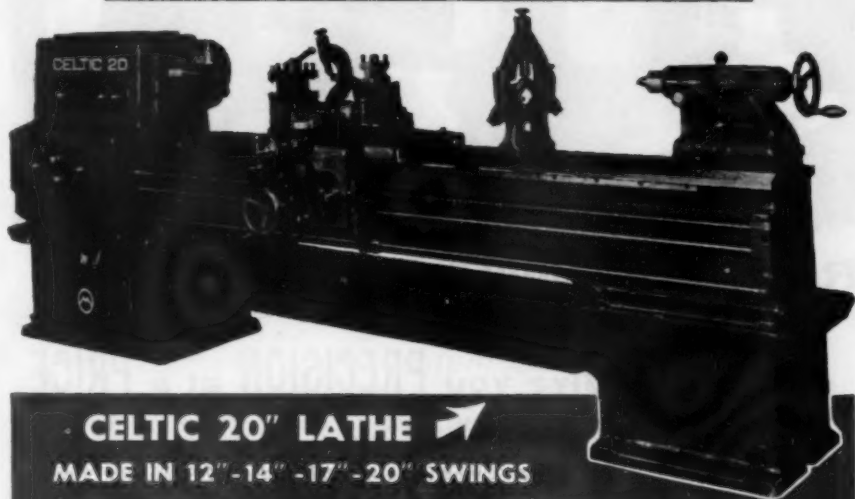
Use postpaid card. Circle No. 242

MONDIALE

CELTIC PRECISION LATHES

QUALITY • PRECISION • DEPENDABILITY

OVER 30,000 MONDIALE LATHES ARE
IN USE THROUGHOUT THE WORLD



CELTIC 20" LATHE



MADE IN 12" - 14" - 17" - 20" SWINGS

OUTSTANDING FEATURES:

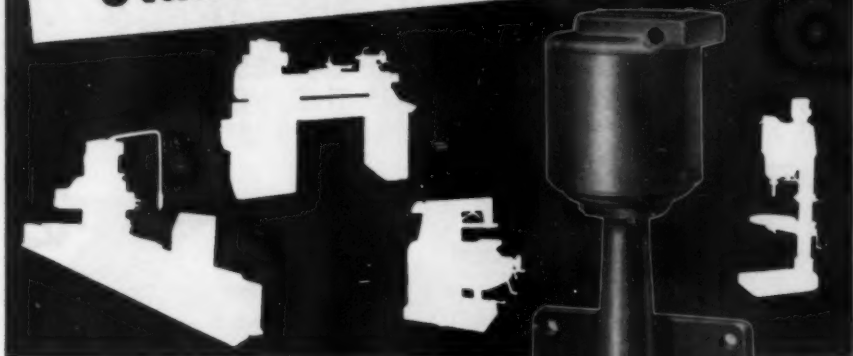
Precision hardened and ground spindle • Standard taper key-drive spindle nose • Hardened and ground gears and shafts • Equipped with anti-friction bearings • Automatic built-in safety devices prevent simultaneous engagement of the lead screw and feeds • Helical gears in the apron assures smooth and silent operation • Removable gap affording extra capacity at no additional charge • Splash lubrication • Direct Vee-belt drive between motor, gearbox and headstock results in smooth and fine finishes • High spindle speeds.

DEALER INQUIRIES INVITED

INDEX INDUSTRIAL CORPORATION

Use postpaid card. Circle No. 243

Standardize Your Pumps



Ruthman **GUSHER** COOLANT PUMPS



Model
5 P3

Give you **PRECISION** at a **PRICE**

Yes, Ruthman Gusher Coolant Pumps are precision built of the very finest materials, yet their initial price is moderate, maintenance cost practically nothing. It will pay you to standardize the pumping on all your metal cutting machinery with Ruthman Gusher Coolant Pumps.

FROM THE SMALLEST TO THE LARGEST,
Flange or Immersed Type
THERE'S A GUSHER FOR EVERY NEED

Model
11025



Model
5 P3

Write for our complete catalog today!

THE

Ruthman

MACHINERY CO.

- COOLANT PUMPS
- CIRCULATORS • AGITATORS
- MOLTEN METAL PUMPS

1816 READING ROAD

CINCINNATI, OHIO

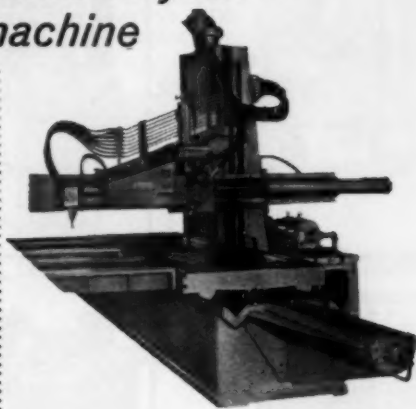
Use postpaid card. Circle No. 244

MACHINE and TOOL BLUE BOOK

*You'll find a full range of coolant pumps
—from 1/30 to 7½ HP. Write and tell
us what you need, we'll be glad to quote
to your specifications—Better still call us
at MA 1-5462.*

NOW SYNCHRO-TRACE*

*can be applied to your
milling machine*



***SYNCHRO-TRACE**—*the fully automatic 3D programmed control system that cuts cost of dies, molds, and contoured parts by over 50%.*

Yes—Now your toolroom, production, or planer type milling machine can be equipped with Synchro-Trace automatic duplicating control—and the result—greatly increased profits per machine.

Fully automatic operation of Synchro-Trace allows the operator, formerly required, to perform other important duties. Better machine finish means up to 50% less time required for hand finishing. Any shape of part may be duplicated—even 90° walls—and with greater accuracy.

For full information on adapting your machine to Synchro-Trace fully automatic 3D duplicating, consult your nearest True-Trace distributor or direct factory branch plant—TODAY. Synchro-Trace may also be purchased as original equipment on new milling machines.

For complete data write for new illustrated brochure #STM-1 today. Dept. MT-2

TRUE-TRACE

SALES CORP.

9830 Rush Street, El Monte, California

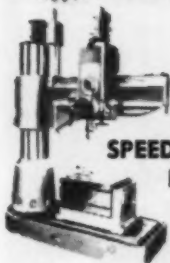
Branch Plants: 35 Urban Avenue, Westbury, Long Island, New York

2401 Eaton Lane, Racine, Wisconsin

Use postpaid card. Circle No. 245

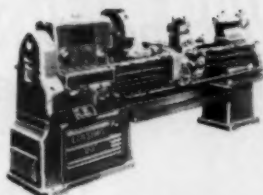


for NEW low-cost hi-precision TOOLS!



SPEEDMASTER RADIALS

From
2' to 12'

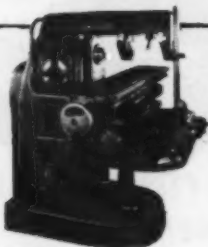
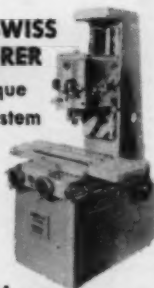


LANSING LATHES

from 12" up to 180" swings
bed lengths to order

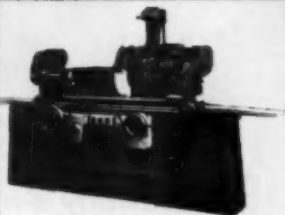
PERRIN-SWISS JIG BORER

with unique
optical system



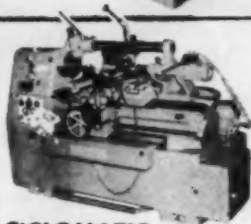
SUPERMILL MILLING MACHINES

Plain — Univ. — Vertical
all sizes



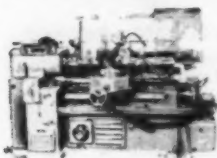
ELGIN GRINDERS

Cyl. — Horiz. & Vert.
Surface Types all sizes



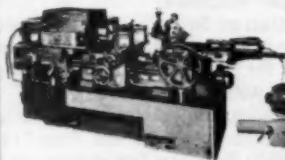
CICLOMATIC PRODUCTION TRACING LATHE

Two sizes — 18" and 24"
swings



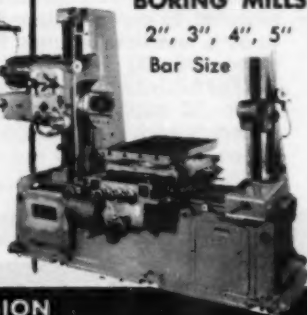
MAN-AU-CYCLE

World's Fastest
Threading Lathe
— all sizes



MINGANTI TURRET LATHES

Ram, Saddle &
Automatic Models



SUPERMILL BORING MILLS

2", 3", 4", 5"
Bar Size

Write Today
for Detailed
Specification
Brochures

NEW EQUIPMENT DIVISION

S & S MACHINERY COMPANY

135 53rd STREET
BROOKLYN 32, NEW YORK
HY 4-1011 2 7400

6945 BANDINI BOULEVARD
LOS ANGELES 22, CALIF.
RY 4-2131

Check your skill in tap selection with this **HY-PRO "TAP-nology" TEST**

NICKEL-IRON PART

Tap through hole with #0-80 tap in missile part made of extremely tough and abrasive 50% nickel — 50% iron alloy. Machine tapping.

Which tap would you choose?

HSS 2 flute
spiral point GH 2
Hy-crome finish

HSS 2 flute
plug point GH 2
Ferrox finish

The HY-PRO #311 tap with Hy-crome finish (left) produced *5.7 times* the number of holes per tap obtained with the 2 flute plug tap.

PLASTIC PART

Tap blind hole with #8-32 tap in extremely abrasive high-temperature thermosetting plastic. Semi-automatic machine tapping operation.

Which tap would you choose?

HSS 2 flute
spiral point GH 7
bottoming
Nitride finish

HSS 5 flute
GH 7 bottoming
Hardernell finish

The HY-PRO #510-5 tap with Hardernell finish (right) produced approximately *11.3 times* the number of holes per tap obtained with the 2 flute spiral point tap.

If you picked the wrong taps, don't be surprised. Most tap users make similar errors, without realizing it, when they buy taps by "habit," instead of by comparative performance.

These examples show *how much it pays you* to be right about taps. To make sure your "TAP-nology" is up to the minute, consult HY-PRO tap engineering specialists. It costs nothing, and records prove it is often the first step to big savings. Write: Dept. H.

Call your local
HY-PRO
DISTRIBUTOR
for standard taps
FROM STOCK

HY-PRO TOOL COMPANY

DIVISION OF CONTINENTAL SCREW CO.

NEW BEDFORD, MASS., U. S. A.





POWER

ACCURACY

ECONOMY

LONG LIFE

VERSATILITY

Here's a Battery of **PROFIT PRODUCING PERKINS PRESSES**

For years some of the largest metal working plants in the country have used batteries of Perkins Presses to economize on space, lower production cost and ease of operation. They're the **LITTLE GIANTS** of the industry. Sturdy . . . Versatile . . . Economical.

WRITE DEPT. BB4
for catalogs showing
variety of
models and complete
specifications.

Shown here is the Press Room of the Acme Chain Corp. of Holyoke, Mass., now operating 175 Perkins Presses. Before you buy, check the economical price of these long-life profit-producing Presses.



PERKINS
MACHINE COMPANY

WARREN, MASS., U.S.A.

Use postpaid card. Circle No. 248

MACHINE and TOOL BLUE BOOK



Don't Scrap — Center Lap!

**EX-CELL-O LAPPING MACHINES DELIVER
HIGH SPEED AND ACCURACY AT LOW COST**

Ex-Cell-O Lapping Machines eliminate out-of-line, out-of-round and incorrect angles in centers. Result: Guaranteed accuracy in subsequent machining, scrap is cut by a healthy margin. Built by Ex-Cell-O, these machines deliver precision with ease. Remember, don't scrap—center lap—write for Bulletin 40271—or, better yet, call your Ex-Cell-O Representative.

57-13



Center Lapping corrects inaccuracies, assuring precision in subsequent operations between centers.

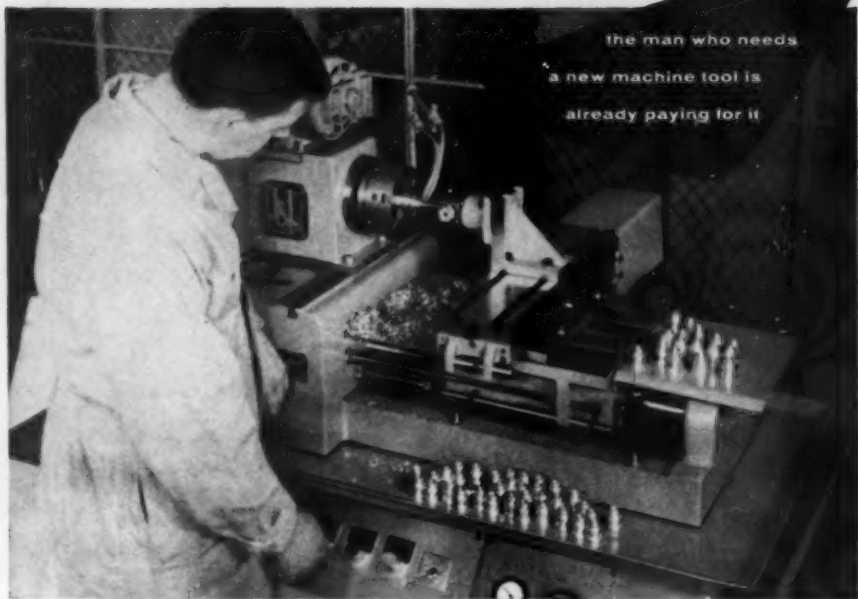


EX-CELL-O FOR PRECISION

EX-CELL-O
CORPORATION
DETROIT 32, MICHIGAN

MANUFACTURERS OF PRECISION MACHINE
TOOLS • GRINDING AND BORING SPINDLES
• CUTTING TOOLS • TORQUE ACTUATORS •
RAILROAD PINS AND BUSHINGS • DRILL
JIG BUSHINGS • AIRCRAFT AND MISCEL-
LANEOUS PRODUCTION PARTS • DAIRY
EQUIPMENT

Use postpaid card. Circle No. 249



the man who needs
a new machine tool is
already paying for it

"Stingiest" Machine ever made

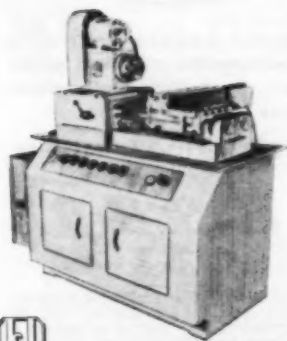
The J & L Precision Boring Machine is a mechanical tightwad: "Savings" for the owner are written all over it.

To begin with, its purchase price is far less than you would guess. Then, after it is set up, you find that just about anyone can handle its push button operation. Its simple design doesn't require expensive maintenance either.

This machine's "tightness" extends even to the spindle. It's not only extremely accurate, but also allows adaptation of various types of tooling. It has a threaded nose that will accept all standard air, or manually operated chucks and an inside taper to accommodate 5C collets.

Think that's economical? Well this penny pincher will turn, face and bore at high production rates, yet, because tooling combinations can be shifted quickly, it takes care of the short runs too.

One other thing about the J & L Precision Boring Machine . . . it has a tendency to push its owners into a higher income bracket. If this prospect leaves you undaunted, write for further information.



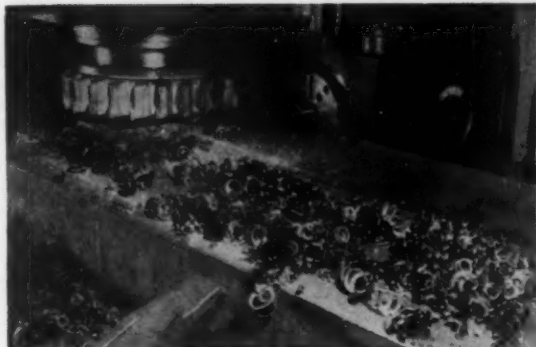
JONES & LAMSON

Machine Company • Dept. 710, 520 Clinton St., Springfield, Vt.

Turret Lathes • Automatic Lathes • Tape Controlled Machines • Thread & Form Grinders • Optical Comparators • Thread Tools

Use postpaid card. Circle No. 250

MACHINE and TOOL BLUE BOOK



Cutter at completion of roughing cut. 1/2" stock removal. Note efficient, uniform chip formation.



1/16" finish cut. Note fine surface finish, a result of true running, flywheel cutting action.

1/2" STOCK REMOVAL on part of MISSILE LAUNCHING PAD AT ONE PASS!

... Another Outstanding
NELCO Carbide Tipped
Tooling Application



And that's not all... the 1/2" roughing cut at 14" per minute feed and the 1/16" finishing cut at 20" per minute feed were made with the same "standard" off-the-shelf cutter. The operations are performed on a 50 H.P. Gray Planer Mill, the tool is a NELCO 12" face mill for steel.

This versatile cutter has extremely heavy brazed carbide tips to withstand shock and interrupted cuts. Exceptional cutter weight gives flywheel effect and insures superior heavy stock removal and extremely fine surface finishes.

Send for Cutting Tool "Condensalog" with prices on 3300 "Standard" profit improving cutters to: Cutting Tool Division, Brown & Sharpe Mfg. Co., Providence 1, Rhode Island.

Brown & Sharpe

CUTTING TOOL DIVISION

HIGH SPEED STEEL CUTTERS

NELCO CARBIDE TOOLS

END MILLS



FOR THAT EXTRA EDGE IN PRODUCTION



Use postpaid card. Circle No. 251



When you "Put it on the Blanchard"

... be sure to use Blanchard Wheels

Your Blanchard Surface Grinder is designed to give you peak production and economy on hundreds of different grinding jobs. But, for every job you run, *there's one particular wheel that does it best!* That's why Blanchard manufactures and stocks a wide variety of silicate, resinoid and vitrified bonded wheels and segments.

Your Blanchard representative will be glad to help you select the wheel—or wheels—best suited to your grinding operations. Call or write him today.

May we send you a copy of "The Art of Blanchard Surface Grinding" (4th Edition)?

THE BLANCHARD



MACHINE COMPANY

64 State Street

Cambridge 39, Mass., U. S. A.

Use postpaid card. Circle No. 252

For the Precision
of a Count-down



T-J

**LAUNCHES A NEW
CUTTING TOOL LINE
FOR MILLING ACCURACY**

For precision milling to close tolerances, so vital in today's high-speed, high-production manufacturing, T-J now offers a new, improved line of milling cutters. The new cutter line features a high helix angle, double back-off, and a right-hand spiral to produce more and smoother cuts between grinds, and a free-cutting, stronger tool.

Specially designed and precision-manufactured for die sinking and production milling, the new line is designed to include flats on the shanks for set screw type drivers on all of the end and side milling cutters. Write today for complete information to the Tomkins-Johnson Company, Jackson, Mich.

Ask for completely new
cutter catalogue No. 259.

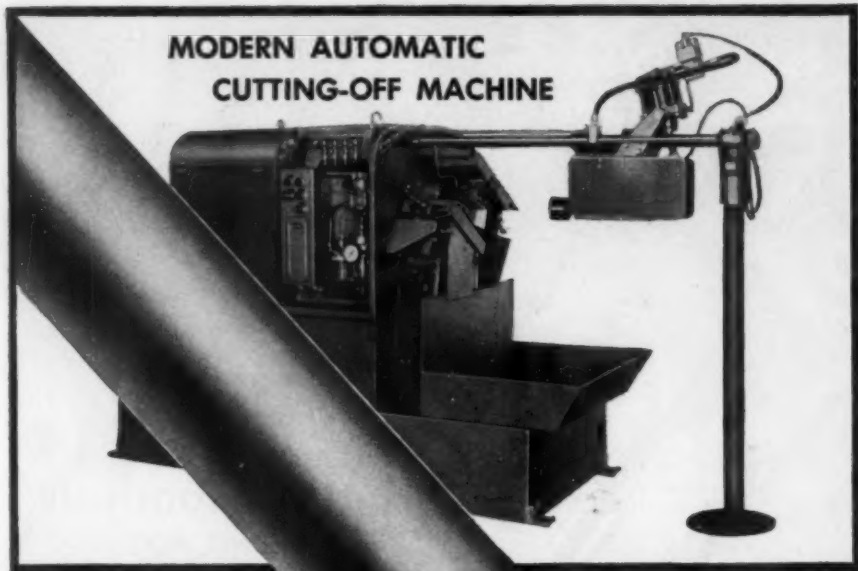
T-J

TOMKINS-JOHNSON

DRILLING AIR AND HYDRAULIC CYLINDERS CUTTERS COLLETTERS

Use postpaid card. Circle No. 253

MODERN AUTOMATIC CUTTING-OFF MACHINE



Fast cut-off in lengths from a fraction of an inch to several feet with micrometer accuracy. Handles any length of stock and cuts any material that can be turned—bar stock up to 3" O.D.—tubing up to 8" O.D. Will cut-off, form, groove, flange and chamfer in a single operation—at a high rate of speed.

**CUTS TUBING,
PIPE AND
BAR STOCK
FAST**



WRITE for CATALOG

Describes all models. Complete specifications. Shows automatic bar feeder that handles entire load of stock with no operator attention, even with random lengths. Also, hot spinning machines and Safety Drill Tables.

103

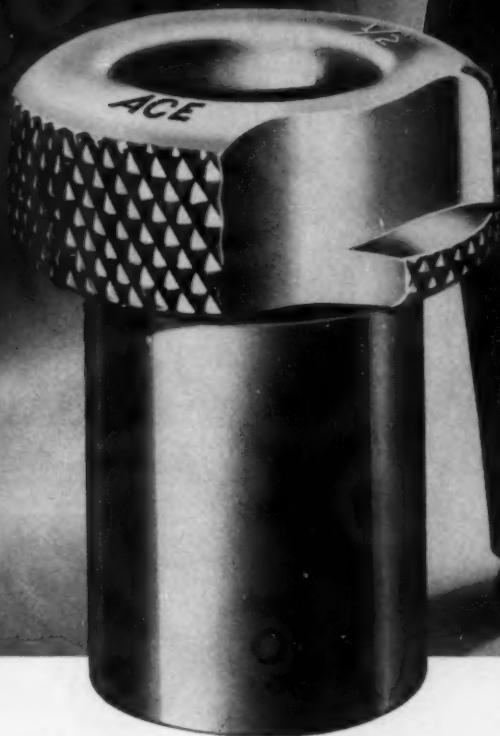
MODERN MACHINE TOOL COMPANY
JACKSON, MICHIGAN

Use postpaid card. Circle No. 254

MACHINE and TOOL BLUE BOOK

THIS IS AN **ACE** DRILL BUSHING

the one that outwears and outperforms!



IT'S GRATIFYING TO KNOW YOU MAKE THE BEST!

The man who makes Ace Drill Bushings is no Johnny-come-lately. He's not a novice. His bushings last a long, long time. That makes them cost you less.

He cares about quality. Some say it doesn't pay to build stuff too good . . . just get by . . . imply that engineers don't know the difference, but they're wrong. The man who makes Ace Drill Bushings doesn't buy that line.

He makes the best. Doesn't have to offer excuses or alibis. Doesn't have to dodge his customers; they're his friends. He saves them lots of money. He backs every claim with controlled quality . . . His Drill Bushings are consistent — every one the same — you can depend on them.

He sleeps well at night, too — every night — year after year. His customers are happy. He doesn't worry about competition — just goes right on making the very best drill bushings — rolling up bigger and bigger sales.

We're talking about ACE — the DRILL BUSHINGS that are superior. *Try them. You'll see.*

STOCKED, FOR IMMEDIATE DELIVERY BY LEADING TOOLING SPECIALISTS IN YOUR COMMUNITY.

ACE DRILL BUSHINGS

NEW JERSEY

611 McCarter Highway
NEWARK 1 Mitchell 2-3006



HOME OFFICE

CALIFORNIA

5407 Fountain Ave.
LOS ANGELES 29 HO 9-8253

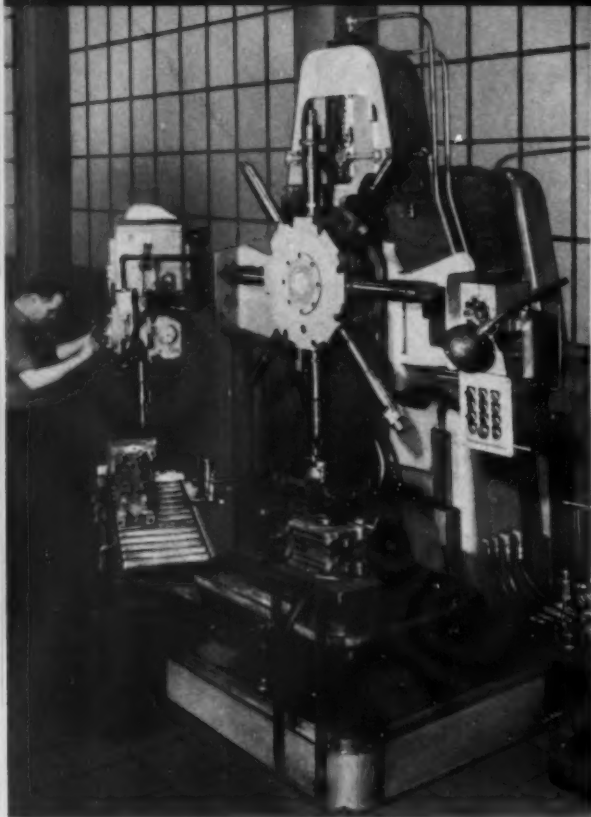


MICHIGAN

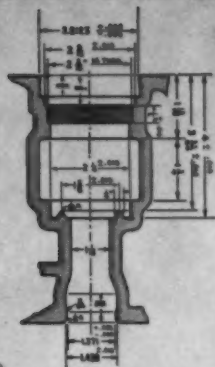
10620 West Nine Mile Road
DETROIT 37 Lincoln 8-0777

"AB" Pipe Bracket Production

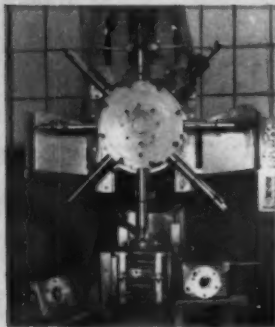
BURGMASTER automatic hydraulic



One man conveniently runs the automatic hydraulic Burgmaster and also drills and taps 2 holes on the small radial drill nearby. Production is increased 100%.



Cast iron "AB" Valve Pipe Brackets showing 13 machining operations performed on the Burgmaster 8 Spindle Turret Drill. Production was increased 200% over former turret lathe operation.



Close-up showing large multiple carbide tipped boring tools and special 180° indexing fixture. Valve parts are now machined in .1760 hours instead of .3342 hours—increasing production 100%.

Specialists in High Production Turret Drilling



11" Manual
Power Index
1/2" Capacity



15 Manual
Power Index
3/4" Capacity



29 Manual
Power Index
1 1/4" Capacity



28F Flange Mounted
Power Index
1 1/4" Capacity



28H Automatic
Hydraulic
1 1/4" Capacity



28H Automatic
Hydraulic
1 1/4" Capacity



28R Ram Type
Radial Drill
3/4" Capacity



28WT-28HT Automatic
Taps Controlled
3/4" and 1 1/4" Capacity

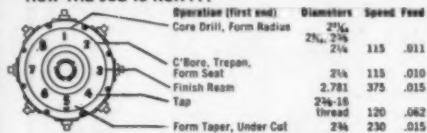
Increased 100% with... 8 SPINDLE TURRET DRILL

(at Canadian Westinghouse Co. - Air Brake Division)

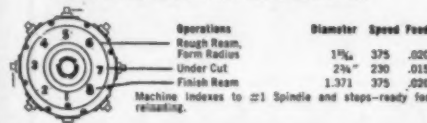
Good tooling that takes advantage of the powerful Burgmaster 3 BH 8-Spindle Automatic Hydraulic Turret Drilling Boring and Tapping machines is increasing production on "AB" Valve Pipe Brackets 100% at Canadian Westinghouse Co., Air Brake Division, Hamilton, Ontario. 15 precision operations are automatically performed in 10.5 minutes including core drilling 2-15/16, forming 2.8125", tapping 2 3/4"-16, reaming 2.781, and under cutting. Formerly these parts were machined on a turret lathe in 21.4 minutes. The parts are held in a 180° indexing fixture and 5 of the Burgmaster spindles are used for the first sequence of operations. During this time the operator drills and taps two 3/4-16 threads, and one 3/4-18 pipe thread on a small radial drill. Burgmasters are pace setters, automatically doing the work and the thinking, requiring only loading, unloading, and starting by pressing a button.

Burgmasters are field proven machine tools that produce efficiently because of the automatic hydraulic machine functions. The turret is power indexed, permitting skip indexing and selecting the desired spindle. 20 speeds may be supplied ranging from 20 to 1700 rpm, which are pre-selected and automatically shifted for each spindle. Feeds are infinitely variable and pre-selected for each spindle. Adjustable micro-depth stops and adjustable control for rapid traverse to and from the work are provided for each spindle to save valuable machine time and speed machining cycles. As a result all operations are performed at the most efficient rate commensurate with fine finish, accuracy, speed and longest tool life.

HOW THE JOB IS RUN . . .



Machine indexes to $\pm 1/8$ Spindle and stops in up Position.
Note: Operator Drills and Taps two 3/4-16 threads and one 3/4 pipe thread on a radial drill during this portion of the automatic Burgmaster Cycle.
Fixture is now indexed 180° - Press Button to start machine.



Maximum Flexibility is assured—because all machine functions are adjustable, the machine can be set up with different tools and fixtures in approximately one to one and a half hours to produce other parts—automatically.

Burgmasters may be supplied as complete production units, including fixtures and tools ready to go into production. Manufacturers are finding they may be tooled to replace many different types of machines to effect substantial savings, increase production, and cut costs. Why not ask a Burgmaster field engineer to make recommendations on your work? There is no obligation.

Job Facts

Company: Canadian Westinghouse Co., Air Brake Division

Machine: Burgmaster 3 BH Automatic Hydraulic Turret Drill

Part: "AB" Valve Pipe Bracket

Material: Cast Iron

Fixture: Special 180° Hand Indexing

Tools: Special Carbide—Multiple Cutting

Former Method: Turret Lathe

Former Time: .3562 hours

Present Time: .1760 hours

Production Increase: 100%

Other Advantages: Operator drills and taps 3 holes on a radial drill during Burgmaster Automatic Machining—Less Floor Space—Burgmaster can be readily tooled for other work when desired—in obsolescence.

Write for bulletin describing Burgmaster 6 and 8 spindle Automatic Hydraulic Turret Drills in detail. Twenty-minute 16mm sound film showing Burgmaster turret drills in operation, including the new automatic positioning table, available from any office.



BURG TOOL

MANUFACTURING COMPANY, INC.

15001 South Figueras Street, Gardena, California
Facility 1-3510 Davis 9-4158



BURGMASER DIRECT SALES OFFICES:

Ridgewood, N.J.
86 North Maple Ave.
Gilbert 4-3002

Chicago 25, Ill.
5329 Lincoln Ave.
Long Beach 1-1178

Cleveland 7, Ohio
14706 Detroit Ave.
Academy 6-7030

Detroit 37, Mich.
13730 W. Eight Mile Rd.
Lincoln 8-4333

San Francisco, Calif.
1341 Old County Rd.
Belmont, Calif.
LYtle 1-0309

Plus dealer
representatives in other
industrial centers.

**FIRST IN
HIGH-SPEED
METAL
CUTTING**

STONE MACHINERY



**CLOSE-TOLERANCE
CUTS ON . . .**

**BARS • PIPES • TUBING
STRUCTURALS • SHEET
PLATE • EXTRUSIONS**

**Ferrous and Non-ferrous
Metals • Non-metallic
Materials**

With one stroke, Stone metal cutting machinery outmodes hacksaws and bandsaws in the metal cutting field. Any material, regardless of hardness, can now be cut with machine tolerances in less than 4 seconds per square inch, leaving a mill-like finish that requires little or no machining.

Stone offers a complete line of metal cutting machines ranging from manual or automatic chop-stroke cut-off machines to traverse-type units that cut sheet and plate up to 12 feet in length.

Illustrated is the Model M-750, typi-

cal of Stone Machinery's dependable construction. The fully enclosed, 7½ H.P. geared-in-head motor delivers full power to the cutting edge. The fast-acting, self-centering vise quickly adjusts for angle cutting (up to 46°). The heavy, cast, table-surface is finely machined for use of jigs and fixtures. Precision-cast frame gives maximum rigidity and support for fast, accurate cutting.

Other Stone Metal-Cutting Machines available with 3½ to 15 H.P. motors. Stone machines may be equipped for manual, semi-, or fully automatic operation. Optional Oil Mist Spray is easily attached—doubles or triples the life of the blade for non-ferrous cutting.

STONE MACHINERY COMPANY, INC.

11 Fayette St., Manlius, New York

"...represented in every major industry throughout the world."

SEND FOR FREE FOLDER

For full details of the modern, faster, less expensive method of cutting, plus the details of other Stone cutting machinery, write today.

All-New Precision Stewart-Warner PORTABLE BALANCER

Engineered for precision balancing of all rotating machinery. 1. Stroboscope and meters mounted in same portable head for easy one-man operation. 2. Removable, lightweight electronic unit for easier balancing in confined spaces. 3. Electro-magnetic pickup can be placed on machine part, freeing operator's hands.



cuts maintenance costs by enabling you to eliminate even smallest vibrations!

Stewart-Warner's new portable balancer is priced to make it economical for even small shops to own their own balancing equipment. Its portability permits easy *in-place* balancing and vibration analysis of assembled machinery. Indicates angle and amount of unbalance . . . determines rpm and amount of vibration. Helps produce finer finishes and closer tolerances . . . aids in reducing noise and worker fatigue . . . permits quality control *before* equipment is put in operation or shipped to a customer.

Also: a complete line of permanently installed cradle type balancers to meet every job type or short run precision balancing requirement.

**Mail coupon
for full details!**

STEWART-WARNER CORPORATION
Industrial Balancer Department
Dept. WW-89 1850 Diversey Parkway
Chicago 14, Illinois

Please send me your Industrial Balancer catalogs.

Name

Company

Address

City

Zone

State



Serving the Industry Since 1852

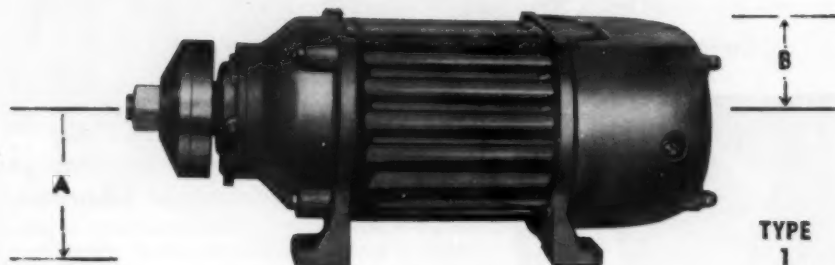


Specify

WOODS MOTOR ARBORS

for **MORE POWER**

in **LESS SPACE**



"A"
DIMENSION

4½"
5⅛"
6½"
8⅜"

HP at
3600 RPM

1 - 7½
1 - 20
5 - 30
20 - 60

FRAME
SERIES

20
30
40
50

"B"
DIMENSION

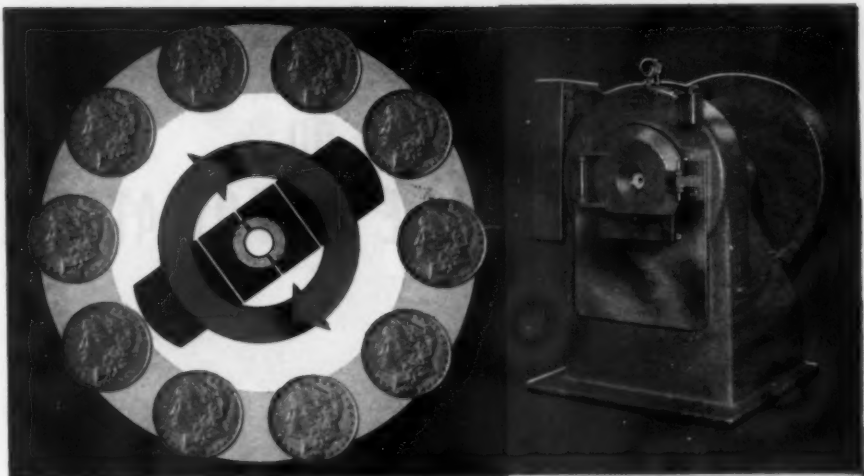
3¼"
4"
5⅛"
7-1/16"

Send for descriptive material

MOTOR DIVISION

S. A. WOODS MACHINE CO.
27 DAMRELL STREET
BOSTON 27, MASS.

Use postpaid card. Circle No. 260

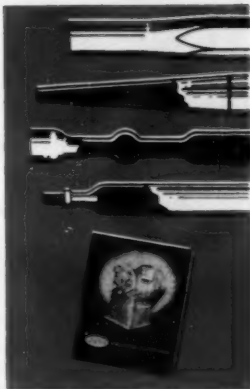


Moneymaker

Fenn Rotary Swaging makes money by saving money for its users. In fact, with swaging, you save five ways:

- low initial capital investment
- tooling is relatively low in cost
- material savings
- labor savings
- time savings

Fenn Swaging Machines offer many advantages in both design and construction. They perform an almost limitless variety of pointing, tapering, reducing, sizing, and assembly operations. Capacities range on solid bar stock from $\frac{1}{32}$ " to $3\frac{1}{4}$ ", and tubing to 6". To be sure that you are not machining when you should be swaging, write for Fenn swaging catalog.



Sets the Pace
IN ROTARY SWAGING

THE FENN MANUFACTURING COMPANY 905 FENN ROAD • NEWINGTON, CONN.

Use postpaid card. Circle No. 261

Lead-Screw Threading and Tapping on GREENLEE AUTOMATICS



SAVES YOU

✓ **MONEY**

✓ **MAINTENANCE**



Lead-screw threading and tapping attachments for Greenlee Automatics make it easy to thread parts otherwise impractical for automatic bar machine operations. Smooth, precision threading with excellent finish make this type of operation profitable for you.

Look over the threaded products at the right . . . then ask your Greenlee Representative to show you this and other ways Greenlee Automatics can help you beat rising production costs.

WRITE
FOR
CATALOG
A-405



Use postpaid card. Circle No. 262

GREENLEE BROS. & CO.
1750 MASON AVENUE
ROCKFORD, ILLINOIS

MACHINE and TOOL BLUE BOOK

SCHRILLO

**ADJUSTABLE MICRO-STOP *
COUNTERSINK**

**Positive-Locking!*



Don't Take Our Word - YOU BE THE JUDGE!

Never will you find so much value at so low a price! Highest quality steel and superb workmanship. Precisely engineered to provide instant finger-tip adjustment to .001" without the use of wrenches or tools. Self-lubricating oversize bearings. Ball-thrust friction-resistant operation guarantees longer trouble-free wear.

The Positive-Locking Micro-Adjustment assures controlled accuracy to a tolerance of $\pm .001$ " — to prevent costly production losses by over or under cutting. Glass-smooth shield will not scratch or mar work piece. May also be used interchangeably for precision trepanning or removing collars from Hi-shear rivets.

TWO SIZES: 4" for cutters up to $\frac{5}{8}$ " dia; 5½" takes cutters to 1½" dia.
For complete information about superb Schrillo Tools—write or phone for the all-new catalog No. 104F

SCHRILLO

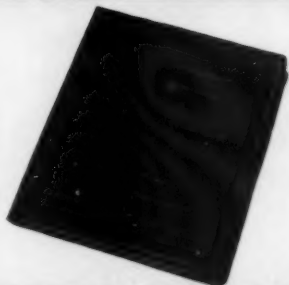
AERO TOOL ENGINEERING COMPANY
8715 MELROSE AVE., LOS ANGELES 46, CALIF.

Use postpaid card. Circle No. 263

FLUID POWER . . .

"industrial hydraulics and pneumatics"

A new
"job-related,"
home study course
"Installation,
Operation,
and Maintenance"
of F/P Equipment.



Mr. Manager:

Why not consider
Hitchcock's F/P course
for your
company sponsored
employee training
program?

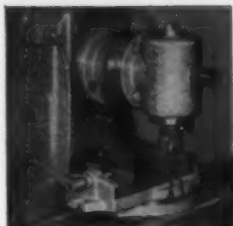
Send for
descriptive literature

- A solution to Industry's need for Trained Men in F/P
- A bright future for properly trained personnel
- N F P A impartial approval
- Authors—2 of the nation's leading authorities on Fluid Power
- Reasonably priced—Many courses, company sponsored
- Talk it over with your management.

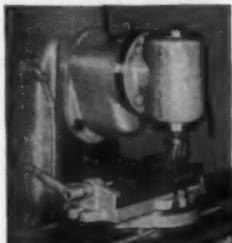
Hitchcock
Publishing
Company

TRAINING for INDUSTRY DIVISION
WHEATON, ILLINOIS

Use postpaid card. Circle No. 264



Heavy Duty Vertical
Milling Attachment



Heavy Duty Offset
Vertical Milling Attachment



Universal Milling Attachment



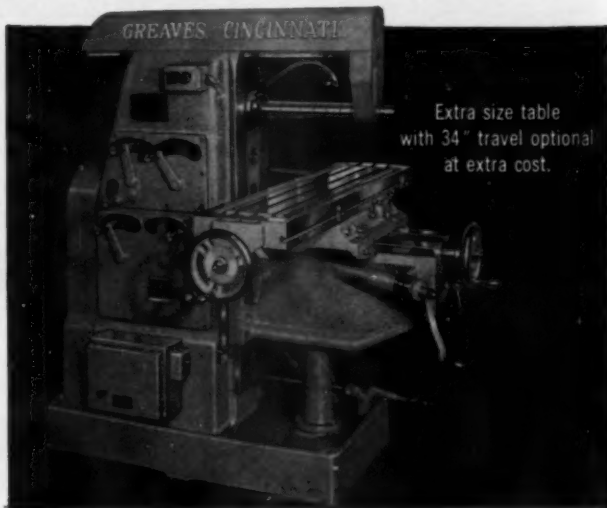
Toolmakers Overarm

Heavy duty attachments increase versatility of dependable, low-cost **GREAVES MILLS**

"THE MOST MILL FOR THE LEAST MONEY"

A full line of attachments and accessories offer outstanding flexibility for all types of milling operations . . . with GREAVES MILLS.

Make your own comparison of 22 specifications of Greaves and 7 other leading milling machines.



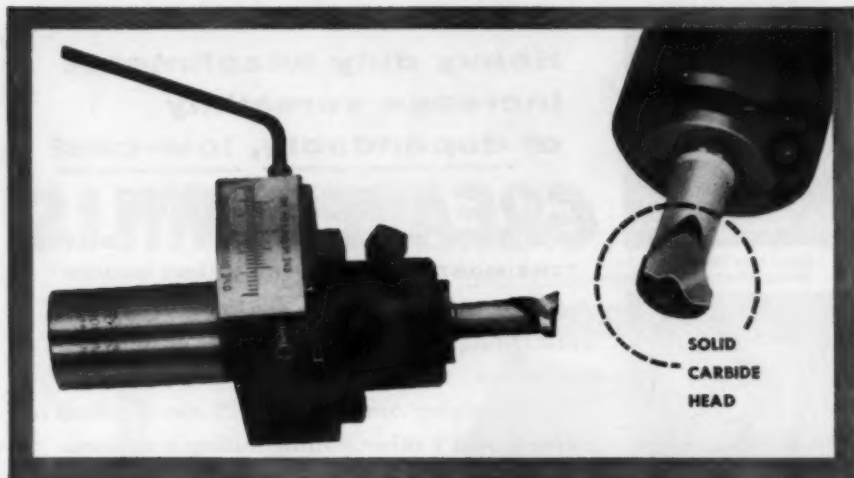
Extra size table
with 34" travel optional
at extra cost.

GREAVES MACHINE TOOL CO.
2600 Eastern Avenue, Cincinnati 2, Ohio

Send Comparison Chart. I will make my own comparison of GREAVES MILLS with other makes.
Send information on Attachments and Accessories for GREAVES MILLS.

NAME _____ TITLE _____
FIRM _____
ADDRESS _____
CITY _____ STATE _____

Send coupon for
**FREE Comparison
Chart** and detailed
descriptive literature
on easy-to-use
attachments.



BOKUM Your Best Buy in Boring Tools

Illustrated here is one of the tool industry's most versatile combinations—the Bokum Swing Tool Holder and the Bokum Short-Neck Boring Tool with solid carbide head.

The Bokum Swing Tool Holder provides precision, offset boring on turret lathes, screw machines and multiple spindle automatics. These modern tool holders eliminate many secondary reaming operations . . . provide maximum rigidity . . . reduce set-up time

because they are vernier adjustable within .001" and are available with holder shanks ranging in size from $\frac{5}{8}$ " through $1\frac{3}{4}$ ".

Bokum Short-Neck, Carbide Head Boring Tools offer maximum accuracy because their short, stubby neck increases rigidity . . . are guaranteed to maintain correct clearance angles throughout tip life . . . require sharpening on one face only and are available in as many as five neck lengths per size range.

Write today to Dept. H for catalog HSS-500; CT500 and 483-1.



TRADE MARK REG. U.S. PAT. OFF.

BOKUM TOOL CO. INC.

14775 Wildemere Ave., Detroit 38, Michigan

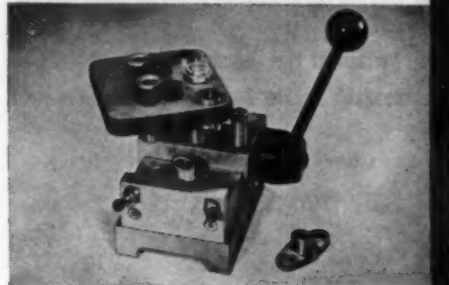
Use postpaid card. Circle No. 266

MACHINE and TOOL BLUE BOOK

TOOL QUICKLY

LIFT SWING DRILLING FIXTURE

*For Long or Short Runs
Saves Precious Tooling-Up Time
and Fixture Costs*



Low Initial Cost

Separately tooled top plates can be used on the same fixture base.

Swing-away top plate permits faster drilling operations, and provides tremendous tooling-up advantages. Take advantage of the "ease of tooling" features.



Write for Lift Swing Tooling Suggestions. Bulletin LS-58

ACCURATE BUSHING CO.

ASA Standard Drill Bushings • Precision Parts • Lift-Swing Drilling Fixtures

444 NORTH AVE., GARWOOD, N. J.

Use postpaid card. Circle No. 267

Makes Any



Superior

MD-1 Mandrel Driver

DRILL PRESS *a* VERTICAL HONING MACHINE

Rapid, economical hole finishing and sizing with .0001 accuracy. Ideal for die work, bushings, dowel pin holes.

Only the stones contact work piece, assuring long life and preventing marks on honed surfaces.

Permanent type mandrel sizes; .120 to 3.000; available in No. 2, 3 or 4 morse tapers.

Stocked in all principal cities.

Send for details and prices.

SUPERIOR HONE CORPORATION

1616

Elkano Street

Elkhart, Indiana

Use postpaid card. Circle No. 268

IT HAS **QUALITIES** YOU WANT

Bunting

Alcoa Aluminum Bars

BUNTING BEARING ALUMINUM offers improved quality over low priced Bronze Bars and at a comparable price. It possesses the important qualities which make a good sleeve bearing material, namely:

- Good heat conductivity
- Excellent embedability
- Good ductility
- High load-carrying capacity
- High resistance to corrosion
- Conformability to the shaft
- Good fatigue strength

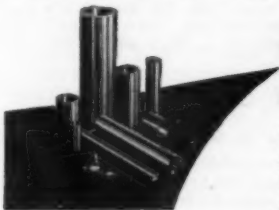
Your Bunting distributor now has in stock 138 sizes of 13" tubular and solid Bunting Bearing Aluminum Bars. Write or ask for catalog and literature.

Other Products Available from Your Bunting Distributor

866 stock sizes of Bunting Cast Bronze Bearings and 267 sizes of Bunting Cast Bronze 13" Bars.

667 sizes of Bunting Sintered Oil-Fitted Bronze Plain, Flange and Thrust bearings and 84 sizes of Sintered Bronze 6 1/2" Bars. Ask for Catalog 58.

343 sizes of Bunting Cast Bronze Electric Motor Bearings for all motors. Ask for Catalog 258.



Bunting.

BEARINGS, BUSHINGS, BARS AND SPECIAL PARTS OF CAST BRONZE OR SINTERED METALS. ALCOA® ALUMINUM BARS.

The Bunting Brass and Bronze Company, Toledo 1, Ohio
Branches in Principal Cities
Copyright 1958 by The Bunting Brass and Bronze Co., Toledo, O.

Use postpaid card. Circle No. 269

ASK HIM

Your Bunting distributor is listed in the classified section of your telephone directory usually under Bars—Brasses and Bearings—Bronzes.

NEW... and Startling

(in price and performance)

FAMCO'S NEW POWER PRESS LINE

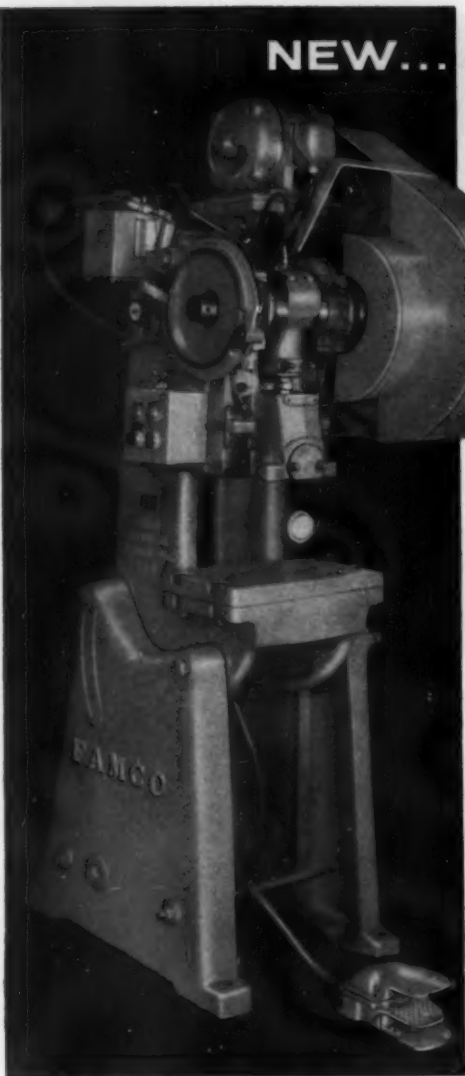
Here's the power press line that gives you all the press economies you need . . . lower maintenance, greater production and lower cost.

Furthermore, Famco Power Presses—6 to 18 tons—are equipped with a pneumatic friction clutch and brake. A high torque, low inertia unit that self-compensates for wear and assures you years of additional press life.

Write today for literature on the new Famco Power Press line.



Pneumatic friction clutch and brake, never needs adjusting, never overheats.




f a m c o

machine company

3118 Sheridan Road • Kenosha 8, Wisconsin

PRESSES . . . AIR, ARBOR, POWER, FOOT
SQUARING SHEARS, MILLING MACHINES,
BAND SAWS

Use postpaid card. Circle No. 270



what
is
good

BLADE LIFE?

It could be minutes... where a high surface feed rate is calculated to remove a lot of metal fast.

Or, it could be hours... where a slower sfm rate means a smaller pile of chips, but lengthened blade life.

The point is, every job has a different set of variables that affect performance characteristics and costs. And an essential part of our product is a study of these variables to help you develop the lowest cutter costs consistent

with improved performance. We consider your machine, work piece, feed rate, depth of cut, speed and finish requirements.

Only after this information is pooled with your own knowledge of the application—costs and performance of present equipment—is any cutter or grinding technique recommended.

We would welcome the opportunity to tell you more about this unique cutter selection service. Write:

This helpful new booklet tells you how to reduce the cost of chips and improve your milling and boring performance. Ask for a free copy of booklet No. 69E.



THE
INGERSOLL
MILLING MACHINE COMPANY
CUTTER DIVISION
505 FULTON AVENUE • ROCKFORD, ILLINOIS

Use postpaid card. Circle No. 271

GRINDING CIRCULAR FORM TOOLS?

**They'll cost less made from SOMMA blanks—
delivery from stock.**

You not only save the expense of making up blanks in your tool room, you save time as well, since same day shipment can be made on No. 00, No. 0, and No. 2 B&S blanks as well as Davenport form, sizing and roll blanks. Blanks also available for other machines or made of T-5 High Cobalt Steel.



Write for name of Somma representative near you, and price list of blanks and complete line of Standard Circular Form Tools.

Somma TOOL CO., INC.

West Coast Warehouse: 576 N. Prairie, Hawthorne, Cal.

**121 SCOTT ROAD
WATERBURY, CONN.**

Use postpaid card. Circle No. 272

District Managers MACHINE and TOOL BLUE BOOK

EASTERN DIVISION

Dan E. Reardon, V.P. in charge
c/o Hitchcock Publishing Co.
55 West 42nd Street
New York 36, N.Y.
Telephone: LAcKwanna 4-4528

CONNECTICUT

Dan E. Reardon, V.P.
Box No. 1, South Glastonbury, Conn.
Telephone: MEdford 3-7083

EASTERN NEW YORK STATE, N.J., MD., D. of C., EASTERN PA., DELA. and VIRGINIA

Doug Horst
c/o Hitchcock Publishing Co.
55 West 42nd Street
New York 36, N.Y.
Telephone: LAcKwanna 4-4528

Home Tel.: (Cadara Grove, N.J.) Center 5-0057 MAINE, N.H., VERMONT, MASS., R.I., LONG ISLAND, N.Y.

Donald J. Leverish
Granite, Drive
Norwalk, Conn.

CENTRAL DIVISION

INDIANA & SOUTHERN PART OF COOK COUNTY

Henry J. Smith, V.P. in charge
c/o Hitchcock Publishing Co.
Wheaton, Illinois
Telephone: MOntrrose 5-1000

TOLEDO, OHIO

James C. Stewart, V.P.
c/o Hitchcock Publishing Co.
Wheaton, Illinois
Telephone: MOntrrose 5-1000

MICHIGAN

William E. Jacobs
10432 W. McNichols
Detroit 21, Michigan
Telephone: DIamond 1-9525

ILLINOIS, MISSOURI, IOWA, WISCONSIN, MINNESOTA, UPPER PENINSULA of MICH., & SOUTH DAKOTA

Robert G. Belinder
c/o Hitchcock Publishing Co.
Wheaton, Illinois
Telephone: MOntrrose 5-1000

WESTERN NEW YORK STATE, WESTERN PENNA., NORTHEASTERN OHIO

Ralph E. Helfrick
1507 Edgely Avenue
Cleveland 24, Ohio
Telephone: HIlcrest 2-0189

WESTERN DIVISION

CALIFORNIA, ARIZONA

Keith H. Evans
3723 Wilshire Boulevard
Los Angeles 5, California
Telephone: DUnkirk 8-2981
and
515 Market St. Bldg. (Rm 225)
San Francisco 5, California
Telephone: YUkon 2-4280

OREGON, WASHINGTON

Lloyd Thorpe
786 Dexter Horton Building
Seattle 4, Washington
Telephone: MAin 2-4363

HITCHCOCK PUBLISHING CO.

• Telephone MO 5-1000 •
Wheaton, Ill.

FIRST CLASS
PERMIT NO. 272
WHEATON, ILLINOIS

BUSINESS REPLY MAIL

No Postage Stamp Necessary If Mailed in the U.S.A.

POSTAGE WILL BE PAID BY

MACHINE and TOOL BLUE BOOK

READERS' SERVICE DIVISION

WHEATON, ILLINOIS

FIRST CLASS
PERMIT NO. 272
WHEATON, ILLINOIS

BUSINESS REPLY MAIL

No Postage Stamp Necessary If Mailed in the U.S.A.

POSTAGE WILL BE PAID BY

MACHINE and TOOL BLUE BOOK

READERS' SERVICE DIVISION

WHEATON, ILLINOIS

August, 1959

For free information . . . use these postage-free Action Cards

Free Literature circle key numbers

1	11	21	31	41	51	61	71
2	12	22	32	42	52	62	72
3	13	23	33	43	53	63	73
4	14	24	34	44	54	64	74
5	15	25	35	45	55	65	75
6	16	26	36	46	56	66	76
7	17	27	37	47	57	67	77
8	18	28	38	48	58	68	78
9	19	29	39	49	59	69	79
10	20	30	40	50	60	70	80

New Products

circle key numbers

81	93	105	117	129	141	153	165	177	189
82	94	106	118	130	142	154	166	178	190
83	95	107	119	131	143	155	167	179	191
84	96	108	120	132	144	156	168	180	192
85	97	109	121	133	145	157	169	181	193
86	98	110	122	134	146	158	170	182	194
87	99	111	123	135	147	159	171	183	195
88	100	112	124	136	148	160	172	184	196
89	101	113	125	137	149	161	173	185	197
90	102	114	126	138	150	162	174	186	198
91	103	115	127	139	151	163	175	187	199
92	104	116	128	140	152	164	176	188	200

Company

Name

Position

Street

City

Zone

State

Product Mfd.

August, 1959 For free information . . . use these postage-free Action Cards

Advertisements

circle key numbers

201	226	251	276	301	326	351	376	401	426	451	476	501	526	551	576
202	227	252	277	302	327	352	377	402	427	452	477	502	527	552	577
203	228	253	278	303	328	353	378	403	428	453	478	503	528	553	578
204	229	254	279	304	329	354	379	404	429	454	479	504	529	554	579
205	230	255	280	305	330	355	380	405	430	455	480	505	530	555	580
206	231	256	281	306	331	356	381	406	431	456	481	506	531	556	581
207	232	257	282	307	332	357	382	407	432	457	482	507	532	557	582
208	233	258	283	308	333	358	383	408	433	458	483	508	533	558	583
209	234	259	284	309	334	359	384	409	434	459	484	509	534	559	584
210	235	260	285	310	335	360	385	410	435	460	485	510	535	560	585
211	236	261	286	311	336	361	386	411	436	461	486	511	536	561	586
212	237	262	287	312	337	362	387	412	437	462	487	512	537	562	587
213	238	263	288	313	338	363	388	413	438	463	488	513	538	563	588
214	239	264	289	314	339	364	389	414	439	464	489	514	539	564	589
215	240	265	290	315	340	365	390	415	440	465	490	515	540	565	590
216	241	266	291	316	341	366	391	416	441	466	491	516	541	566	591
217	242	267	292	317	342	367	392	417	442	467	492	517	542	567	592
218	243	268	293	318	343	368	393	418	443	468	493	518	543	568	593
219	244	269	294	319	344	369	394	419	444	469	494	519	544	569	594
220	245	270	295	320	345	370	395	420	445	470	495	520	545	570	595
221	246	271	296	321	346	371	396	421	446	471	496	521	546	571	596
222	247	272	297	322	347	372	397	422	447	472	497	522	547	572	597
223	248	273	298	323	348	373	398	423	448	473	498	523	548	573	598
224	249	274	299	324	349	374	399	424	449	474	499	524	549	574	599
225	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600

Inside Front Cover Inside Back Cover Back Cover
 Inserts: 1A 1B 1C 1D 2A 2B 2C 2D 3A 3B 3C 3D

Company

Name

Position

Street

City

Zone

State

Product Mfd.

GREEN *Pantograph Engravers*

ELIMINATE DELAYS!

Keep the work in your own plant.



PORTABLE 40-POUND BENCH-MODEL 106

Famous 2 or 3-dimensional engraver, successfully used by thousands, features 5 positive, accurate pantograph ratios. Versatile ball bearing spindle has three speeds up to 14,000 rpm; height of pantograph and position of cutter are continuously adjustable; one copy carrier (supplied) accepts all standard master type sizes.

The Model 106 has proven incomparable for speed and accuracy . . . yet reasonably priced.

Cutter grinders, rotary tables, master letters, compound slides, name plates and all required accessories. For complete information, write to



MODEL D2 HEAVY-DUTY 2-DIMENSIONAL

- 575 pounds — rigid, sturdy, precise
- Vertical adjustment of copy table automatic with Pantograph
- Unobstructed on three sides to take large work
- Micrometer adjustment for depth of cut
- Ball-bearing construction throughout — super-precision ball bearing spindle
- Spindle speeds up to 26,000 rpm for engraving or machining modern materials
- Ratios 2 to 1 to infinity — master copy area 26" x 10"
- Vertical range over 10"



**GREEN
INSTRUMENT
COMPANY, INC.**

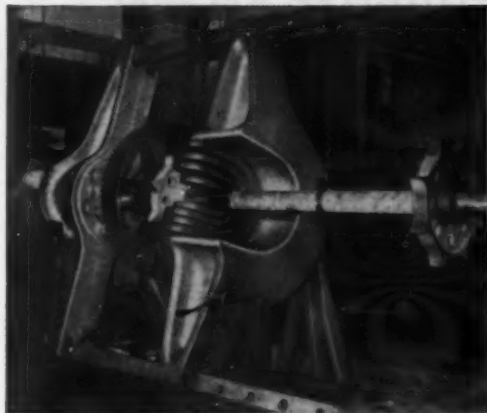
386A PUTNAM AVENUE, CAMBRIDGE 39, MASS.

Use postpaid card. Circle No. 273

August, 1959

73

A MOUNTAIN *of* POWER



POWER FOR BIG JOBS—Here a Rodgers 600-Ton Inclined Forcing Press is forcing a large gear and sprocket from a mine machine shaft.

—or a touch
of pressure

The heavy machines and equipment used in the great iron mining industry present a variety of problems when repair or maintenance is necessary. For this work the accurately controlled action of Rodgers Hydraulic Forcing Presses is a real time and work saver.

A Rodgers Forcing Press puts a mountain of power at your fingertips to force wheels, sprockets or gears from their shafts and for straightening, assembling, swedging or upsetting jobs. Operators also use the versatility, speed, power and positive control of a Rodgers Forcing Press to efficiently perform small pressing and forcing jobs with just a touch of pressure—tasks once done only on vertical shop presses!

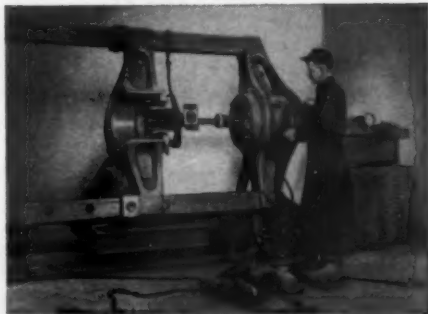
you get both with **RODGERS FORCING PRESSES**

Rodgers vertical, horizontal and inclined forcing presses offer capacities from 100 to 600 tons . . . up to 9 feet between tension bars . . . up to 16 feet between ram and abutment . . . single or double acting cylinders with 13 or 26-inch ram travel (72-inch travel available) . . . electrically powered hydraulic pumps with selective, positive pressure adjustment and remote control . . . removable press cylinders that can be used in special jacking or pulling jobs . . . and many more features that assure you of dependable, long life operation — all fully described in Rodgers Catalog Number 315A.



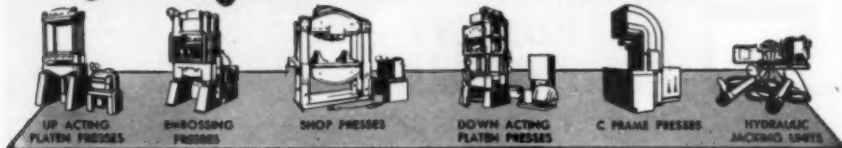
Write for it today!

Rodgers Hydraulic Inc.



LIGHT TOUCH FOR SMALL JOBS—This Rodgers 300-Ton Inclined Forcing Press is used on small as well as large equipment repairs. Here, a pin is being pressed out of a tractor idler support bracket.

7453 WALKER STREET
MINNEAPOLIS 26, MINNESOTA



Use postpaid card. Circle No. 274

MACHINE and TOOL BLUE BOOK



NOW...low-cost barrel finishing with NEW ALMCO ROLL BARRELS!

● Better product parts through use of modern barrel finishing can now be yours . . . *at a fraction of previous time and cost!*

New low-cost ALMCO Super-sheen Roll Barrels provide greater deburring and finishing capacity in less floor space than do small standard barrels . . . and they're more adaptable, too.

Roll Barrel System shown above, for example, includes

Multi-Roll "36", Multi-Roll "78", time-saving loading cabinet, and easy-to-use hoist boom. Nine different barrel sizes provide wide range of speeds and capacities. Using only one barrel or many, one man operates entire system.

For Full Story on Roll Barrel Systems and on processing sample parts, write for ALMCO Album of New Products...*today!*

FREE!

NEW PRODUCT ALBUM
Gives full information on new Almco Super-sheen Systems. Describes new and better machines, methods and media. Write today!

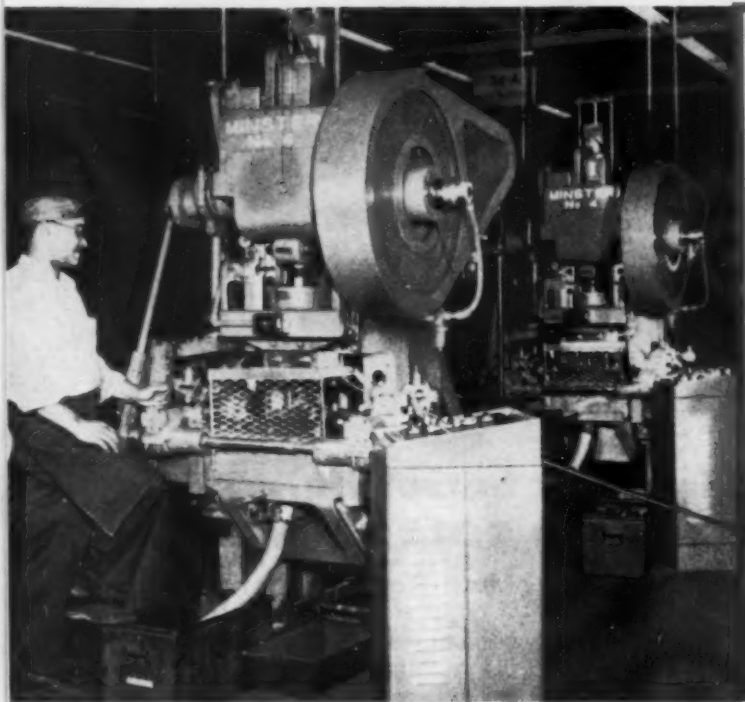


ALMCO QUEEN PRODUCTS DIVISION

King-Seeley Corporation
48 E. Main St.
Albert Lea, Minnesota

AUTOMATIC PRODUCTION

gives you maximum press efficiency, less handling



Minster O.B.I.'s ranging from 12 to 110 tons capacity give superior performance on automatic production because of close bearing clearances, heavy, rigid frames, precise girth fitting and fast controlled action of the Minster clutch and brake.

Photos courtesy of Automatic Electric Company, North Lake, Illinois.

Minster Feed Equipped O.B.I. Presses

Costs decline rapidly when stampings are produced automatically. Speeds are higher, parts more accurate, presses run at top efficiency.

Automatic production . . . long or short run . . . is most profitable when done on a Minster press because every Minster press has the inherent precision and stability needed for this type of work.

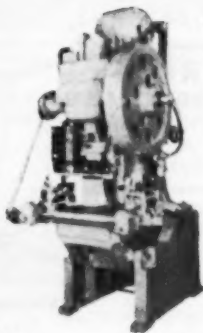
Minster can provide the right press equipped with job-matched feed to assure you of maximum productivity and savings.

Want to investigate the possibilities? Write or call us today.

The Minster Machine Company • Minster, Ohio

MINSTER®

Use postpaid card. Circle No. 276



Features in This Issue

MACHINE AND TOOL
blue book

Interview with Fred Maytag II, President, The Maytag Co.	87
The Push Button Age is Here	97
Should Inspection Jobs Be Put on Incentive	108

Washington News. Members of Congress are busy recruiting supporters for a new approach to foreign aid. Would the methods of depreciation reform advocated by witnesses before the Ways and Means Committee in 1958 result in loss of revenue? Government reports that capital and equipment spending is up. See "Roundup of Washington News."**Page 81**

Interview. One important reason why the Maytag Co. makes such a good showing in the highly competitive home laundry appliance field is their unique system of co-operative interchange of ideas among personnel. In this exclusive interview, Fred Maytag tells about his basic concept of reliability, the company's work simplification program, their budget system and their research and development program
.....**Page 87**

Numerical Control at General Electric. The newly installed numerically controlled machine tools being used to produce tailor-made parts for steam turbine-generators at GE's plant were displayed to members of the technical press recently. GE has done more than demonstrate what a large industry can do with progressive thinking. They have demonstrated eventualities which will affect every manufacturing plant in the country, large or small. Two of the more sophisticated machines, Ex-Cell-O's contour milling machine and Baker Brothers' drilling machine, are described in detail from original concept to what the machines accomplish.**Page 97**

Incentives for Inspectors. Author Harold R. Nissley tells why the dangers and problems of incentives for inspectors are no worse than incentives for production workers. If a system of proper checks and balances are set up before installation of the plan, the end results can be improved inspector morale, better inspectors and even better quality of product.**Page 108**

Precision Blanking and Piercing. Now available to industry is a precision blank and pierce die processing service that provides an excellent opportunity to produce many sheet metal products formerly avoided because of excessive tooling costs. This picture-story describes the dies, shows how they are built and illustrates the economic feasibility of this greatly simplified tooling process.**Page 116**

Boring Large Diameters. Boring roll shells, usually made of cast iron, and ranging in bore diameter from 12 inches to 60 inches and in length from 24 inches to 260 inches, is a common operation at the Black-Clawson Co. shops. The article presents design information and particulars about feed and operation practices about the four shopmade boring bars.**Page 120**

Hand Milling Machines. The Irwin Auger Bit Company makes economical use of hand mills on three of their production lines. The lever-operated set-up makes it possible for operators to take milling cuts as fast as the piece can be locked and the lever moved.**Page 128**

Meetings

Aug. 10-13—Society of Automotive Engineers, National West Coast Meeting, Hotel Georgia, Vancouver, B.C. Headquarters: 458 Lexington Avenue, New York 17, New York.

Sept. 10, 11—The Society of the Plastics Industry, Inc., Midwest Section Conference, French Lick Sheraton Hotel, French Lick, Indiana, Headquarters: 250 Park Avenue, New York 17, New York.

Sept. 28-Oct. 1—American Welding Society, National Fall Meeting, Sheraton-Cadillac Hotel, Detroit, Michigan. Headquarters: 33 West 39th Street, New York 18, New York.

Oct. 12-14—National Electronics Conference, Hotel Sherman, Chicago. Headquarters: 228 LaSalle St., Chicago 1, Ill. Contact: Hal Bergen, 185 N. Wabash Ave., Chicago 1, Illinois.



NEW! MAGNETIC ANGLE IRON HOLDS WORK WITHOUT CLAMPING

Here's another ingenious layout and inspection short cut now available from Taft-Peirce! It's a universal right angle iron and magnetic chuck combined to eliminate the lost time and inconvenience of work clamping and multiple setups.

Work is held firmly in place by energizing the faceplate with a 90° turn of control bar, recessed on each end face. By giving this bar a partial turn, face is slightly magnetized for exact adjustment of work before applying full holding power. Magnetic Angle Iron can be turned on side, back or ends, and faces, sides and ends are precision ground square and parallel within .0002".

ACT NOW! Taft-Peirce Magnetic Angle Irons can help save time and money wherever there's setup work being done. In stock now. Write direct for Catalog 711.

TAKE IT TO

TAFT-PEIRCE



7 MECHANIC AVE., WOONSOCKET, R. I.

Use postpaid card. Circle No. 277

MACHINE and TOOL BLUE BOOK

... Your Source of Fine Metal Cutting Tools



CIRCLE [®] Heat-treated

To Better Your Production

CIRCLE R Circular Metal Cutting Tools are designed and crafted in this plant, one of the largest anywhere devoted exclusively to this specialty. Our extensive facilities — 45,000 square feet — allow for every refinement in production of fine tools, holding within very precise tolerances where required.

SCIENTIFIC HEAT TREATING is one of our specialties. We use the latest and best obtainable furnaces, with automatic controls. Much of the specialized equipment is our own exclusive design, developed to implement our innovations in heat treating methods.

PRECISION CONTROL governs our quality and cost through the finest gauging and other equipment, under constant supervision. Profilometer indicates surface finish variations in micro-inches. Magna-glo inspection rules out rejects before they reach costly finishing stages — for you, virtually does away with down time due to cutting tool defects.

SPECIAL TOOLS are regularly developed to meet your specific needs with efficiency and economy for the widest variety of materials and cutting and slitting operations.

STANDARD PRODUCTS meet your needs in the complete range of slitting saws for metal, copper, textile, metallica, plastics, rubber, sand-paper, emery cloth, etc.; cut off saws, commutator slotting saws,

jewelers' slotting saws, circular knives and rotary shear blades; Deep-Cut saws, Circuloy steel saws, MSS saws, solid and tipped tungsten carbide saws, combined drills and countersinks and center reamers.

CIRCLE R REPRESENTATIVES are at your service in all key markets — specialists in metal cutting, whose advice to you is backed by Factory Consultation Service developed through continuous research and experience since 1923.

Consult these **CIRCLE R Specialists**...

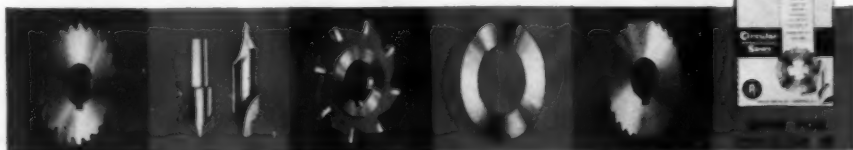
BURBANK Production Mach. Sales Inc.	INDIANAPOLIS Walter F. Greene & Assoc.	PHOENIX B/Eugene Tool Center
CHICAGO Donald Robertson & Co.	MILWAUKEE Ford Tool Co.	PITTSBURGH Nelson, Spawglass & Company
CLEVELAND Production Tool Co.	MONTREAL Humphrey B. Walter	PROVIDENCE Fred J. McMillan
DAYTON J. R. Smith Company	NEW YORK CITY J. & G. Gorman (Export)	ROCHESTER James B. Stone
DETROIT A. H. Spruce	PHILADELPHIA General Tool Sales Co.	ST. LOUIS B. C. Macdonald & Co.
HACKENSACK The Eaton Company		WESTBURY, L. I. The Eaton Company

CIRCULAR TOOL CO., INC.

PROVIDENCE 3, RHODE ISLAND

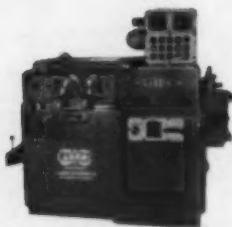
Specialists in Circular Cutting Tools Since 1923

DT4-B

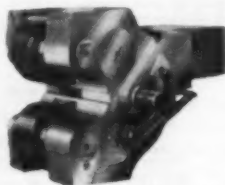


METAL SLITTING SAWS • COPPER SLITTING SAWS • SCREW SLITTING SAWS • COMMUTATOR SLITTING SAWS • JEWELERS' SLITTING SAWS • CUT OFF SAWS • CIRCULAR
KNIVES & ROTARY SHEAR BLADES • CIRCULOY STEEL SAWS • SOLID & TIPPED TUNGSTEN CARBIDE SAWS • COMBINED DRILLS & COUNTERSINKS • CENTER REAMERS

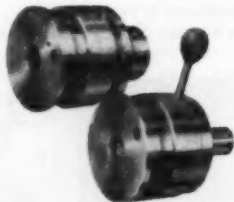
LANDIS HAS ALL THREE



... produce left-and right-hand threads of all types (except square), including UNC, UNF, Acme, worm, and many special forms.



... produce either straight or tapered threads.



... produce Class 4 threads of excellent finish at high speeds and feature replaceable helix angle bushings.

Whatever your Thread Rolling requirement, there is a LANDIS machine or tool to do the job. Our detailed knowledge of the most efficient application of the different methods of thread rolling—and our more than 50 years experience in the threading field—has resulted in our producing a complete line of thread rolling equipment. Make LANDIS your one-stop source for all your thread rolling needs.

LANDIS
Machine
COMPANY

WAVENESBORO
PENNSYLVANIA

"Management Aids for Small Manufacturers: Annual No. 5" is a compilation of 11 "Management Aids for Small Manufacturers" into a single volume reflecting management needs and interests. Ten chapters discuss aspects of internal general management, and one deals with external sources of help, advice, and guidance. The book can be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D.C. for 45c a copy.

Plant, Equipment Spending Rising to New Heights

Latest Government reports confirm predictions of a boom in capital goods—show that almost all segments of business are significantly raising their plans for new plants and equipment.

About the only distress signal on the economic horizon is the danger that a tight credit policy may check capital spending prematurely. Even so, the 1960 boom in machinery and equipment is expected to break all previous sales records.

Members of Congress Seek Overhaul of Foreign Aid

Some influential members of the Senate and House, among them Chairman Fulbright (D. Ark.), Senator Mike Mansfield (D. Mont.) and Representative Chester Bowles (D. Conn.), are busy recruiting supporters for a new approach to foreign aid. They are de-

termined that Congress shall make drastic changes in this "flagrantly wasteful and often ineffective" program.

Proponents of a thorough overhaul of the system favor a limitation of military support to nations actually engaged in battle against Communism. Other nations would only receive economic assistance.

Fulbright has proposed a law guaranteeing Development Loan Fund money over a five-year period—eliminating the need to seek new funds for underdeveloped countries each year. This plan has won the approval of the Senate Foreign Relations Committee, but is opposed by the President.

Another proposal that would serve to give foreign aid a leaner look is a bill that orders the installation of an Inspector General's office within the State Department to supervise foreign aid administration and expenditures.

Depreciation Reform and a Balanced Budget

The American Economic Foundation, a nonprofit organization interested in depreciation reform, has come to the conclusion, based on Treasury statistics, industrial surveys, and statistical studies, that at least some of the methods of depreciation reform advocated by witnesses before the Ways and Means Committee in January 1958 would result in little or no immediate loss of revenue and would increase the revenue in later years.

Using round figures for 1957, the historical cost of depreciable property is \$315 billion, and annual depreciation allowed for Federal tax purposes is \$15 billion—an average rate of about 4%. Current value of depreciable property is \$433 billion. The same rates applied to the current value would produce \$5 billion more depreciation. This is the gross depreciation deficiency.

Under the method known as re-investment depreciation, any funds

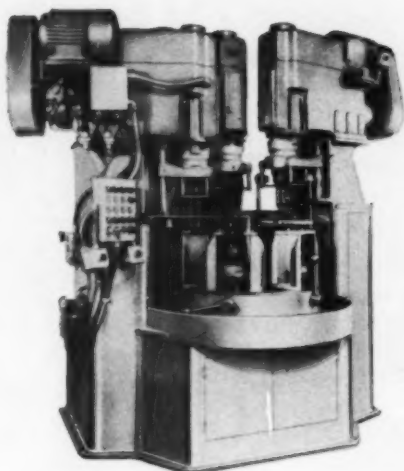
arising from additional depreciation allowed over that available under the present statutes and regulations would be spent for depreciable property; the funds provided by the additional depreciation would be spent in addition to commitments already made or programs already under way.

Expenditures for depreciable property go into the total stream of income and, in the form of wages, material purchases, salaries and profits, generate taxable income. About \$26 of tax revenue for the Treasury is generated by each \$100 spent by business for equipment and machinery. Conversely, at present corporate rates, the Treasury would lose up to \$52 income tax on each additional \$100 of nontaxable depreciation allowance. This loss could be made up by doubling the depreciation allowance, since an expenditure of \$200 for new property would generate \$52 of new tax revenue. Thus, if the entire \$200 were spent for new equipment, there would be no tax loss to the Treasury whatever.

The AFL-CIO has vigorous objections to the measure to provide a special tax deduction for self-employed persons, permitting them to set aside amounts up to 10 percent of their annual income—but not more than \$2500 a year—for retirement deposits, because instead of correcting any existing inequity in the tax laws, the bill helps to create new ones.

Assistant Director Peter Henle
AFL-CIO Department of Research

NEW KAUFMAN MODEL 10E-1125 TAPPING MACHINE



- For drilling, countersinking and tapping a wide variety of flanged valve bodies.
- Three-head machine provided with $7\frac{1}{2}$ h.p. standard head units, four-spindle adjustable heads and five-division index.
- Head units provided with six-speed transmission, hydraulically operated adjustable feed, rapid advance and adjustable time delay at bottom of stroke.

Kaufman's new Model 10E-1125 handles a large range of flanged bodies with different diameter of drills, countersinks and taps on a variety of bolt circles — for example: four holes are completed in part at one time. Whether you need Model 10E-1125 or a machine with standard drilling or tapping head units, or a machine for a new, unusual job — see Kaufman!



Write or telephone for full information today!

KAUFMAN MFG. CO.

539 S. 29th St.

Manitowoc, Wis.

Use postpaid card. Circle No. 280

A COMPLETE

SERIES!

Lodge & Shipley

NEW PRESS BRAKES

WILL YOUR NEW BRAKE HAVE ALL THESE FEATURES AT LODGE & SHIPLEY'S

- NEW . . . Pitman Assembly redesigned for long life with little maintenance
- NEW . . . Combination Air Clutch and Mechanical Brake
- NEW . . . Wedge Ram Pressure Release, improved exclusive design
- NEW . . . Quad-lateral Ram Slide Bearing, full-length, full-time
- NEW . . . Ready-Pivot Ram Adjustment for out-of-parallel operations
- NEW . . . Dovetail, Double Rocker Bed-Mounting on solid steel housing
- NEW . . . "Long Operation" standard controls for versatile operation
- NEW . . . One-piece, heat-treated, machined and ground Eccentric Shafts
- NEW . . . Micro-Fog, oil bath and grease Lubrication System
- NEW . . . Two full bearings on each eccentric shaft
- NEW . . . Sectional die clamps on ram nose open automatically
- NEW . . . Stroke Position Indicator shows top and bottom dead center
- NEW . . . optional Two-Speed Transmission can be field-installed



Available in 120 through 250 ton capacities, bed lengths from 8 to 14 feet. Shown is Model Series 150A10 capacity 1 1/4" x 10" with above-the-floor bed.

New and completely redesigned, Lodge & Shipley Power Press Brakes offer feature after feature important to accurate, low-cost operation. Virtually every one of these advantages are included in the low base price . . . extras on the machine, but *not* on the invoice and many of the models now have an above-the-floor bed!

Space limits us to a bare listing of important new features. Request your copy of the New Condensed Press Brake Catalog today. The Lodge & Shipley Co., 3074 Colerain Ave., Cincinnati 25, Ohio.



More than ever before, your LODGE-ical choice . . . **Lodge & Shipley**

Use postpaid card. Circle No. 281

Investigating NC a Necessity—Now

Representatives of numerically controlled machine tool builders say that it is quite normal to encounter some customer resistance to a machine feature that has been in use but a short time. In addition to the limitations on depreciation rates and the corporate income tax being deterrents to management to equip their shops with the most efficient facilities, very often the prospect is convinced they are not in a position to service the electronic equipment associated with numerical control.

A review of the development of machine tools over the past 20 or 30 years discloses that numerical control follows logically into the trend of automation. Like these other developments in advanced mechanization, there is every reason to believe that as the numerical control technique is increasingly applied, the cost of programming and maintenance will be lowered. From what we've learned, the lost time for repair and maintenance of numerically controlled machine tools is about on a par with conventional machines at the present time.

It is believed that increased acceptance of numerical control depends on standardization. Working toward this goal are various associations and re-

search and development groups. Companies using the technique are co-operating with machine tool builders, providing information on what's needed in a system that should eventually be adopted.

In discussing the business approach GE took in choosing equipment for the LST-G division, W. W. Kuyper, manager of manufacturing engineering, made it clear at the Preview to the press that such project studies were major undertakings. All the various alternatives that modern developments and human ingenuity can devise were examined. The detailed methods of evaluation varied, but always the main purpose was to determine the effects on the cash flow and on the income of the business. The report beginning on page 97 reveals to what extent the balance tips in the direction of numerical control.

Investigation of numerical controls should begin now. The handwriting on the wall indicates that the push-button age is here. If there actually are many important applications for numerical control in a plant, management with a "wait and see" attitude may wait long enough to see the plant closed.

PAUL A. MELINE
Managing Editor

now...over

330

standard Microbore
boring bars from stock!



Your choice of over 330 Microbore standard single-tool or two-tool precision boring bars. A complete range of sizes and types available for boring and facing operations on any make of boring machine, milling machine or turret lathe. *Microbore micrometer vernier adjustment of each tool point* makes it possible to quickly set tools to *precise dimensions*. Boring range from $\frac{1}{2}$ " to $7\frac{1}{4}$ " dia. Standard Boring Rings and Adapters extend range to $13\frac{3}{4}$ ". Available with Straight Shank, NMTB Taper, Morse Taper or Flash-Change. Carbide, ceramic, or high speed steel cartridges. Ordering is Simple! Fast! Direct! Standardize on Microbore—the complete tooling system.

Catalog No. 58 lists industry's most complete line of standard general purpose precision boring bars. Write for your copy.

Also available—special tooling designed from your part prints by our Proposal Engineering Department.

DeVlieg MICROBORE[®] SYSTEM

DEVILIEG MICROBORE • DIVISION OF DEVILIEG MACHINE COMPANY

Fair Street, Royal Oak, Michigan

Use postpaid card. Circle No. 282



LEADERS OF THOUGHT IN INDUSTRY

Why Maytag Is on Top:

Everyone Works at Cost Reduction and Product Reliability

One important reason for Maytag's excellent showing in the highly competitive home laundry appliance field: A unique system of cooperative interchange of ideas among personnel to assure reliable products at lowest cost.

Q. Mr. Maytag, do you take the broad view that quality control and reliability are pretty much synonymous?

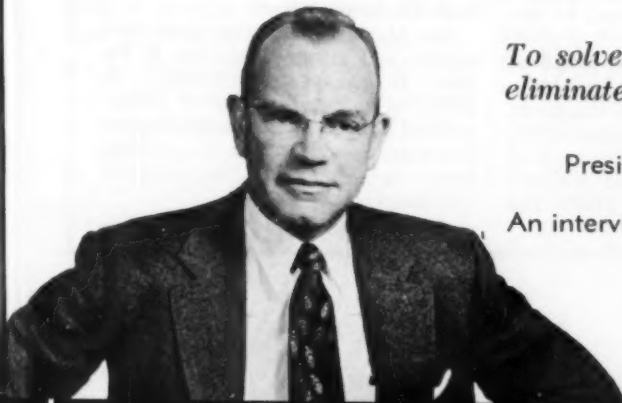
A. Well, of course, quality control refers generally to the techniques of securing quality and reliability. To achieve reliability in a product one first has to start with a basic concept of your top management: a decision that you won't

To solve the service problem eliminate the need for service.

—FRED MAYTAG II

President, The Maytag Co.

An interview with Paul A. Meline



Maytag's Goal: No major repair of product necessary

accept anything less than the best quality you can produce. This requires a steadfastness to avoid making compromises as you go along.

In another area—the matter of safety—there was a time a number of years ago, particularly when we first got into heavy press work, when we had an unsatisfactory accident experience. Investigation

disclosed that our supervisors were compromising with safety whenever parts had to be run under the pressures of maintaining schedules. To get work out they would sometimes allow it to be run under unsafe conditions. It was only when we demanded and achieved complete acceptance throughout the whole plant that no job could oper-

About Fred Maytag

Fred Maytag II is the third generation head of the Newton, Iowa, home laundry appliance manufacturing company which bears his name.

Born in Newton Jan. 8, 1911, Mr. Maytag is a graduate of Newton public schools, Culver military academy, and the University of Wisconsin. He began his Maytag career as a high school student working summer vacations in the company machine shops. The firm was then headed by his father, E. H. Maytag, son of F. L. Maytag, founder of the firm. Late in 1934 he became a full-time employe as a sales representative. From 1936 he held the office of vice-president of the Maytag company and in 1940, some months after the death of his father, he became president.

In addition to serving as president of the Maytag company and the Maytag Company, Ltd., Winnipeg, Canada, Mr. Maytag is a trustee of the Equitable Life Insurance Company of Iowa; director, Minneapolis-Honeywell Regulator company, Iowa Power and

Light company, and Northwestern Bell Telephone company; chairman of the board, Jasper County Savings bank in Newton, and Kellogg Savings bank in Kellogg, Iowa, and president, Maytag Dairy Farms, Inc.

He is a former director and regional vice-president of the National Association of Manufacturers and served three years as chairman of its taxation committee. He is a trustee of Grinnell college, a director of Freedoms Foundation and trustee of Ducks, Unlimited. A member of the board of governors, Midwest Research institute, and of the civilian advisory board, Air Training Command, USAF, he is a board member of the National Industrial Conference board.

Mr. Maytag is a former Iowa state senator and a former member of the Iowa Development commission. In 1956, he received the Navy Distinguished Public Service Award, highest honor the navy can grant to a civilian. He is married and has two sons and two daughters.

for a 10-year period

ate if the conditions were unsafe that we began to make real progress on accidents. As a result of this we have achieved one of the safest operations* in the country for our kind of business.

We have achieved this record only by getting acceptance of the idea that we won't compromise with safety. The same thing carries over with quality. For example on final inspection on one of our products recently we began getting a high wattage reading when it was in operation; the cause of it was not immediately apparent. The head of our inspection organization immediately put an embargo on all shipments; this meant everything in our warehouse. We just stopped shipping against the possibility that we might have some defective merchandise that had gotten through the line and into the warehouse. We had to ascertain whether or not anything that we had produced was susceptible to failure, causing trouble in the field. However, within 24 hours the cause of the trouble had been isolated. My point is, that under the pressure of a backlog of orders and sales people wanting shipments, etc., it would be awfully easy to say, "Oh,

*One lost-time accident per 974,743.6 man hours in 1958.



Ideas for cost reduction and product improvement pay off for Maytag employees with work simplifications program. Idea for increasing tolerance on die used to perforate tubs to reduce maintenance and eliminate sharp burrs won a \$1,500 check for Toolmaker Dick Mosbey, shown here with President Fred Maytag, who presented check.

well, let them go out and probably there aren't very many of them that will cause trouble." So I maintain that you have to start with a basic concept and a conviction that you won't compromise. And this has to be understood by everybody in the organization.

Cost Control

- Q.** Very often the justification for a higher retail price is offering proof that the product is better. What about this matter of pricing your product in line with your competitors in this highly competitive field?
- A.** Actually, I think it's frequently

LEADERS OF THOUGHT

The label "management team"—is it overworked? According to Fred Maytag, it says exactly what he means in providing a smooth running business



"The team concept of many people, each carrying managerial responsibility..."

less costly to give a product a good design, less costly to produce quality merchandise than it is to produce merchandise that isn't reliable. I say this because if you build it right in the first place you eliminate your later costs. These may not be direct costs to the manufacturer, but they are costs to the consumer, and the manufacturer loses good will and sales. You also eliminate costly sorting inspection, where you sort the good from the bad. I don't think any manufacturer can afford to do this sort of thing. You can't put quality into the product by inspection. Inspection should be a method for auditing results and for possible indications of trouble or any deviation from quality standards. You want to discover this early enough so that you can go back to the source of the trouble and eliminate it either in the manufacturing or the design area.

Q. What is the general procedure for getting the various echelons

of management, as well as the man on the line, to follow up on your cost control program?

A. You may think the label, "management team," is overworked, but it says exactly what I mean. The team concept of many persons, each carrying his own individual managerial responsibility, yet all working together for a common organizational goal, is something I consider vitally important. A man makes his most effective contribution when he has a sense of really being a part of the organization and when he is convinced that the decisions he makes and the actions he takes directly affect the success of the total operation.

Work Simplification Program

Q. Would you point to some specific program which results in effective teamwork among your supervisors and other people?

A. For a program that has some unusual aspects, there is our work simplification program. Every supervisor and most of our hourly



"...yet all working together for a common organizational goal..."



"...is something I consider vitally important in business today."

paid workers are given formal training in the principles of work simplification. All employees are encouraged to submit ideas for cost reductions through a formal employee's idea plan. The individual worker receives a cash monetary award up a maximum of \$1500 for cost reduction ideas which he originates and which were approved and which fit into production. He gets half of the net savings for the first six months after the idea goes into effect. Then we have a staff department which assists him in working out the ideas and working with the line people to get them installed and so on. These have to do primarily with cost reductions, and it is the cost reduction that is the measure of his reward.* I am firmly convinced that

the most efficient manufacturer also produces the best quality so that frequently you can make a product cheaper and also better at the same time.

Q. Will you explain where the supervisor fits into the picture. Is there any chance of supervisor and worker competing for ideas?

A. We have no competition between the supervisor and his worker for the ideas. We also get many ideas from our supervisors, but the supervisor does not receive any direct compensation for his own ideas. So, it is to his credit when the people that he supervises submit ideas that are accepted. As a matter of fact, the supervisor is recognized in a non-monetary way for the number of ideas which are presented by people in his seg-

*In 1958 the average award was \$117.40, the highest in the nation for any similar plan. Four employees received maximum awards of \$1500. Last year, 94 percent of Maytag's first line supervisors and 37 percent of the hourly rated employees partici-

pated directly in the program. Cost reductions are estimated at \$1,400,000. Since 1948, over 13,000 cost reducing ideas have been submitted. Approximately 4,200 were accepted and actually put into operation.

LEADERS OF THOUGHT continued

ment of the organization. We have an annual awards banquet in which we give certificates and awards and give recognition to supervisors who made the most worthwhile contributions, and the departments who made the most worthwhile contributions in cost reduction.

Q. *Well, you make cost reduction almost, you might say, a department in itself. Do you have frequent meetings?*

A. Yes, and every department is involved in it. We have our work simplification organization, but it is purely a staff function. This staff is engaged solely in providing a service to others to achieve cost reduction. However, there is an important thing here I want to point out. The results achieved do not materialize because certain people go about the plant showing other people how to do things.

With that sort of system, you encounter the normal human resistance that almost everyone displays when somebody else in authority pushes them. The so-called efficiency expert, I believe, has fallen into disrepute because of this. I think the important thing here is that everybody is concerned with quality: everybody is concerned with cost reduction and the specialists that we have serve in a staff capacity to aid others in carrying out and executing their ideas.

Q. *In other words, there have been*

some intangible benefits to this system? Would you say it has had some favorable effect on the attitudes of your people?

A. I would say it has developed an awareness of the problems we face. It also stimulates them to think constructively about solutions, and to talk about their ideas with the supervisors and staff departments. I am convinced it has helped to overcome the employee's traditional resistance to change by providing him an opportunity to not only suggest constructive changes but to participate in the changes made by management.

Budget System

Q. *It appears you are attacking costs on all fronts. How do you measure your progress?*

A. We have an organization wide budget system, a variable budget, and in every area there are periodic meetings to evaluate performance in terms of budget. Now, the budget for any particular department is not set by somebody from the outside coming to you and saying, "Well, now, this year we are going to let you have X dollars for perishable tools and we are going to let you have Y% for overhead and Z dollars for something else, and you had better stay within it." The budget estimates actually are set by the people who run the department. Basically, they are set as targets. Now, again, we have a



Annual Awards Banquet is occasion for recognition to supervisors whose departments made worthwhile contributions to work simplification and cost reduction methods.



Training sessions are held periodically with supervisors and engineers in attendance. Subject: cost reduction methods.

LEADERS OF THOUGHT continued

budget staff in accounting that renders staff assistance to these people: it consults with them, it compiles the information, it feeds back results to them, etc., but they don't have any authority to set the budget. You set your own budget in your own department, and then you decide what goals you think you can achieve. Every month, the budget department feeds back to you information showing how you have done. So you are, again, not competing with somebody else; you are competing with yourself. You are trying to achieve the standards which you, yourself, have set.

Replacement of Facilities

Q. *Mr. Maytag, the excellence of your production facilities in your new plant has been publicized in the business and trade press. What is your policy on replacement of equipment?*

A. Since the war, we've invested over \$30 million. A substantial part of that was for additional facilities, but a good part of it was an investment in improved facilities, better machines to produce better parts at lower cost in both of our plants. Even though Plant 2, where we build our automatic washers and dryers, is only about ten years old, we have already replaced a substantial amount of equipment there. This is a result of finding better ways to do things because of improvements in technology.

The idea originates, of course, in the manufacturing division, and again, everybody is involved in this, from the vice president of manufacturing down. Then we have a periodic review on these capital expenditures—a meeting which is attended by the executive vice president and the president, as well as the budget people. We discuss with the manufacturing people these proposed projects and evaluate them. Final authority for the go-ahead, of course, comes from the president. But this is a continuing program, and I might say that we have, in my experience, never rejected a proposal on the grounds that we couldn't afford it. We may have rejected proposals because they didn't seem to have promise to produce sufficient results, but never from lack of capital. In this respect, we are fortunate that we haven't had a shortage of capital.

Research and Development

Q. *To produce efficiently a well-engineered product which meets consumer needs must require quite a bit of assistance from your research and development division. Just how is this function set up to fit in with your objective to design for improved product performance, and find ways to produce more efficiently?*

A. The research and development division has the responsibility for design of the product, and this really falls into three categories:



Operation 72: For three days and nights, beginning at 8 a.m. Monday, top Maytag officials, led by Mr. Maytag, receive collect calls from Maytag fieldmen reporting dealer orders of 10 or more appliances. Orders are posted on wall charts. Maytag's 1958 "Operation 72" sales marathon totalled over \$17 million worth of home laundry equipment sold to dealers.

one is the perfection of the models now in production; the second one is the development of new features for existing products; the third function is the development or creation of new kinds of products.*

A very substantial part of their time is devoted simply to trying to make better what we are already producing. We have a very good reporting system, incidentally, in which all field problems, and performance problems are fed back through our service organization directly to the research and devel-

opment people. Every source of trouble with the product becomes a challenge to the designers to find a way to eliminate the cause of it.

Q. *This all appears to be in keeping with your policy of true rather than artificial obsolescence; that changes must be better—not just new?*

A. I might say that on this idea of artificial obsolescence that if a manufacturer adheres to the policy of bringing out a new model every year it is very difficult for him to perfect what he is producing, because he is changing it so frequently that he doesn't have time to bring to perfection what he is producing at any given time.

*Patent issued to Maytag's development division total 204 for the past 10 years, and 111 patent applications are pending at the present time.

Questions and Answers on METALWORKING MACHINERY

...for those concerned with specifying or buying new equipment

QUESTION: Who is the largest national supplier of metalworking machinery equipment?

ANSWER: Ryerson is the largest by far - offering over 3800 different types and models produced by almost 100 of the nation's leading manufacturers.

QUESTION: What types of machinery does Ryerson offer?

ANSWER: The most complete line available anywhere, including the best type and right capacity for every metal-fabricating job of:

Bending	Forming	Punching	Shearing
Braking	Hoisting	Rolling	Threading
Drilling	Pressing	Sawing	Welding

QUESTION: What advantages do I get by buying from Ryerson?

ANSWER: (1) Widest selection, (2) Unbiased recommendations, (3) Double guarantee: the manufacturer's warranty backed by Ryerson assurance of satisfaction, (4) Greater continuing interest because we also value your steel and aluminum buying potential, (5) A nation-wide organization of machinery specialists backed by 117 years of Ryerson experience in working with metal fabricators and in using much of the equipment in its own steel service operations.



MACHINERY DIVISION

RYERSON STEEL®

Member of the  Steel Family

PLANTS AT: NEW YORK • BOSTON • WALLINGFORD, CONN. • PHILADELPHIA • CHARLOTTE • CINCINNATI • CLEVELAND • DETROIT • PITTSBURGH
BUFFALO • INDIANAPOLIS • CHICAGO • MILWAUKEE • ST. LOUIS • DALLAS • HOUSTON • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE



A trip through the "World's Largest Job Shop" offers more evidence that . . .

The Push Button Age is Here

G.E. is upgrading its ability to produce steam turbines

By **Darrell Ward**, Engineering Editor,
and **Paul A. Meline**, Managing Editor

The six numerically controlled machine tools being used to produce tailormade parts for steam turbine-generators at General Electric's LST-G plant add to the increasing volume of empiric evidence that numerical control as a production technique and a controller of cost is developing rapidly.

What General Electric disclosed at their recent machine tool industry press conference at the Schenectady plant was that the world's

largest job shop is replacing machines or tools with entirely new ideas in manufacturing methods and controls. If this move is a sample of the handwriting on the wall, one wonders how many plants, large and small, will be forced to evolve with the inevitable push button age which is now upon us?

Most of the parts being made in the big plant are duplicated few times. Some are made only once! If job shop or small lot production is the function, why put it on tape or punch card? How can this even

be feasible, much less economical, for intricate multiple machining operations to be programmed for a one time or short production run?

This 23-acre manufacturing facility, employing 1,300 machine tools for the manufacture of more than 5,000 different turbine-generator components, is the kind of a plant where lead time can be trimmed profitably with programming methods. A numerically controlled milling machine, for example, turns out extruded copper conductor bars just 45 minutes after a simplified engineering drawing has been completed and programmed on punch cards. This job formerly required 16 weeks of lead time and 60 man hours of production time!

More than 40 numerically controlled machine tools, costing roughly \$5 million and ranging in size from small drilling machines to a giant, four-story vertical stub

bar machine and boring mill, have been installed or are on order for use in about 30 of the company's decentralized operating departments.

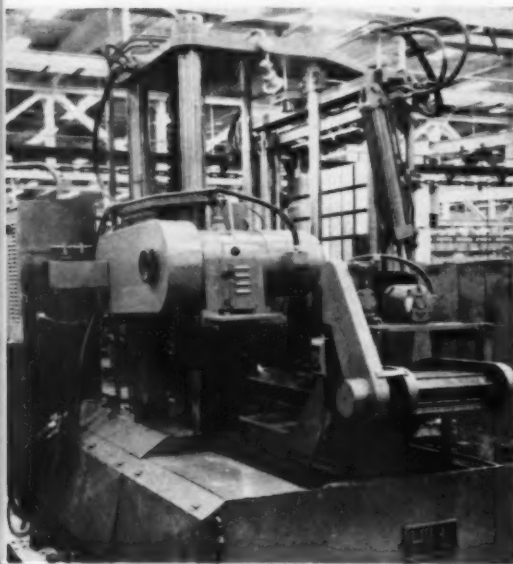
Larger Engineering Staffs

As H. R. Hill, manager of manufacturing for the LST-G Dept. pointed out, the manufacturing engineering component of the business has become increasingly important with the passing of time. G. E. is continually looking for more and more engineers in the manufacturing phase of the business.

Obviously, this is borne out in any discussion of all the new equipment at GE. Programming on card or tape, or by any other means for that matter, demands greater engineering skill for every operation. Designing of piece parts and methods and process planning under such conditions requires greater engineering skill. Tabulation of reasons could go on to infinity proving why our modern, scientific approach to everyday necessities requires greater and greater skill from more highly trained people, while fewer and fewer people of little or no skill will find jobs in any kind of shop.

The handwriting on the wall is

Tape-controlled, high-speed, single-spindle horizontal Hill drilling machine capable of drilling 8 to 10 inches per minute through 10-inch plate.





only brought into better focus by GE's press conference on electronic controls, card or tape, for custom tailored equipment in a giant job shop operation.

All kinds of programmed material will soon become as much taken for granted in average metal-working operations as it is right now in many routine functions of a small office equipped with popular business machines of today. It was only a few years ago when an office manager would have thought it stupid to consider sorting machines or electronic computers to replace a dozen clerks and typists. It was only a few days ago when many plant managers thought it stupid to consider some of the fantastic production and programming equipment just made public in job shop type operations at GE.

Electronically programmed methods of production are inevitable in many more operations than one would suppose and far sooner than some would like to admit. Why? Take a hint from GE. You

Bank of six cutting heads performs 250 operations to machine copper conductor bars for generators. Built by the Simmons Company, Albany, N.Y., the bar milling machine is completely card-controlled by two reader card controls through the console to main control panel. Both the rib section and the cover section of the hollow conductor bars are arranged parallel on the ways and are machined at the same time. Each bar averages 19 feet in length, is 1¾ inches wide and about 5/16th inch thick and made of copper.

Head No. 1 contains a wire brush and actuates clamps to hold the material being worked. The brush cleans the surface and removes burrs.

Head No. 2 puts in slugs for blocking passages and welds them in place. Each bar requires about 26 slugs which are automatically fed from a hopper to the head.

Head No. 3 is a dual operation, cutting front side ports and back end tapers.

Heads 4 and 5 make 45-degree cuts, both on the right and on the left side of each bar.

Head No. 6 is for deribbing or channel widening. It also makes the end cutoff and prepares the bars for brazing.

must provide for future growth with facilities and methods adequate to meet anticipated needs over the long haul, not just tomorrow or next week. You will have to adjust piece prices with new jobs, not with simple methods changes. You must appraise

NUMERICAL CONTROL continued

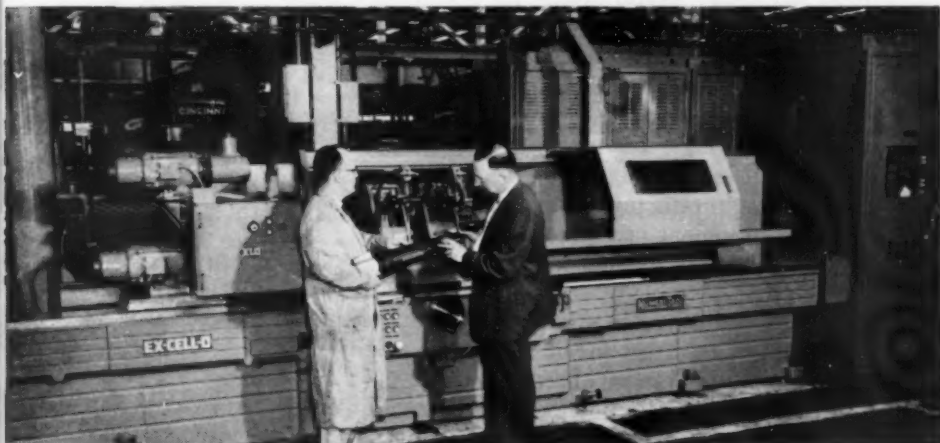
your ability to utilize all your facilities in the most effective manner, not at some key points with bottlenecks in between.

GE has done more than demonstrate what a large industry can do with progressive thinking. They have demonstrated eventualities which will affect every manufacturing plant in the country, large or small, right down to the back alley shop which, at some future date, may not be able to compete in trying to produce single piece parts by old fashioned methods and equipment.

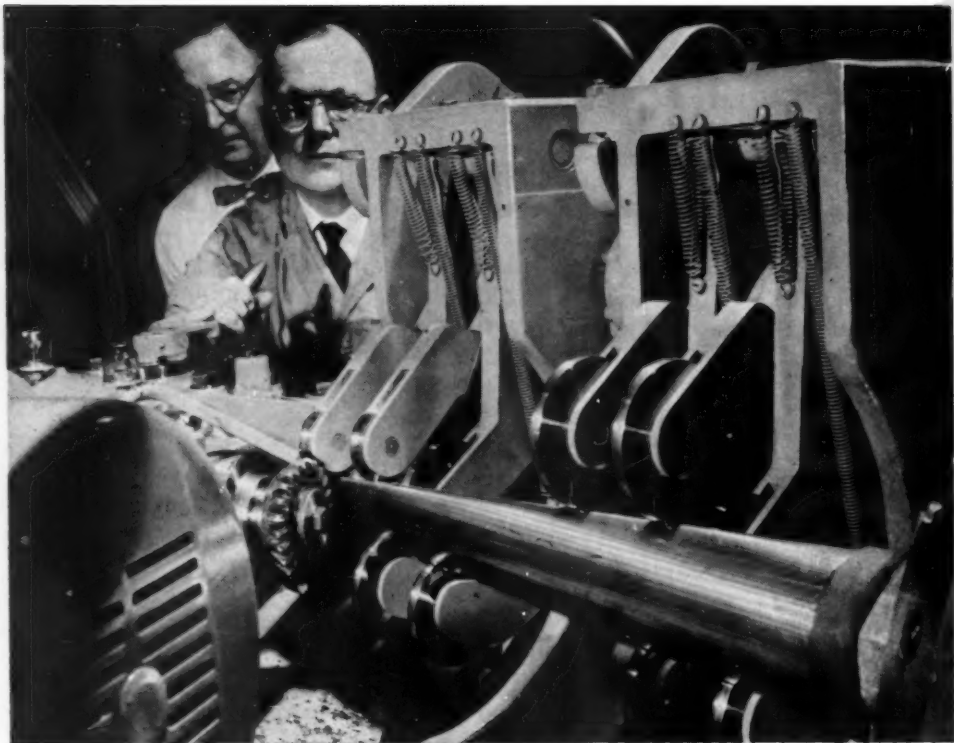
As is proved by GE on a large scale, electronically programmed manufacturing operations can attain greater accuracy, greater speed, greater economy, greater uniformity, and even greater flexibility than the human hand.

Milling Steam Turbine Buckets

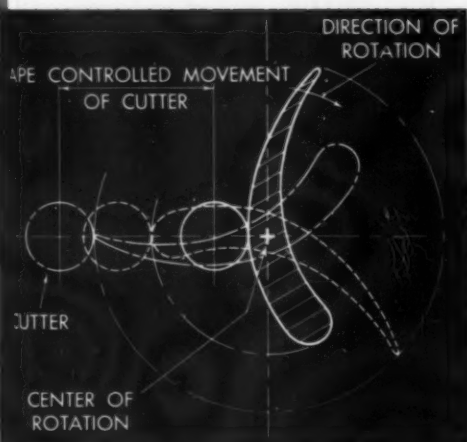
Steam turbine buckets are essentially the same as the buckets used in jet engine turbines and the blades used in jet engine compressors. When the subject of steam turbine buckets came up, Ex-Cell-O engineers considered this work in the light of their experience with jet blades and buckets. Ex-Cell-O has a complete line of production machines for profiling the airfoil areas of jet engine blades from rough forgings, and has more than 10 year's experience in the actual production of jet blades in volume and to aircraft tolerances. Ex-Cell-O machines for jet blades use cams to control the relationship of the cutter or grinding wheel to the work. What General Electric needed was substantially a larger version of a jet blade pro-



New type of miller does three-dimensional machining in a full circle around the turbine buckets, preparing them for grinding and finishing.



New numerically controlled profiling machines can handle turbine buckets with over-all length up to 72 inches and vane length of 60 inches with a maximum width of 12 in.



Drawing shows tape controlled movement of cutter around the bucket.

filing machine with tape control instead of cams.

Since General Electric also wanted to accommodate blades up to 11 inches wide and six feet long and having airfoil areas up to five feet long, it required a large machine. Ex-Cell-O has had a great deal of experience in building thread grinders to handle large workpieces and hold close tolerances over many feet of thread. By adapting some of the proven features of precision thread grinders and the technique of the blade milling machines, their engi-

neers were able to come up with a practical design for a very rugged and precise machine.

Many steps were taken to ensure smooth operation and accurate response to signals from the control system. For example, the actuating screws that operate the table and cross slide are circulating ball nut screws that are heavily preloaded. Both ends of the screws bear against preloaded thrust bearings. Both table and cross slide ride on anti-friction rollers for ease of movement and sensitivity to control signals. All gearing is designed to eliminate backlash and give immediate response in either direction.

The development and application of this new manufacturing technique enables engineers to have freedom to design the most efficient shapes of buckets for large steam turbine-generators. New designs can be put into production in a matter of days. Thus engineers will have more freedom to change designs by not being forced to wait three to four months for preparation of a three-dimensional master.

In preparation of the tape which controls the machine, data taken from blueprints is transferred to punched cards. These, with a program deck are run through an IBM 704 computer, and a half-inch magnetic tape is obtained. This is fed into an electronic director which

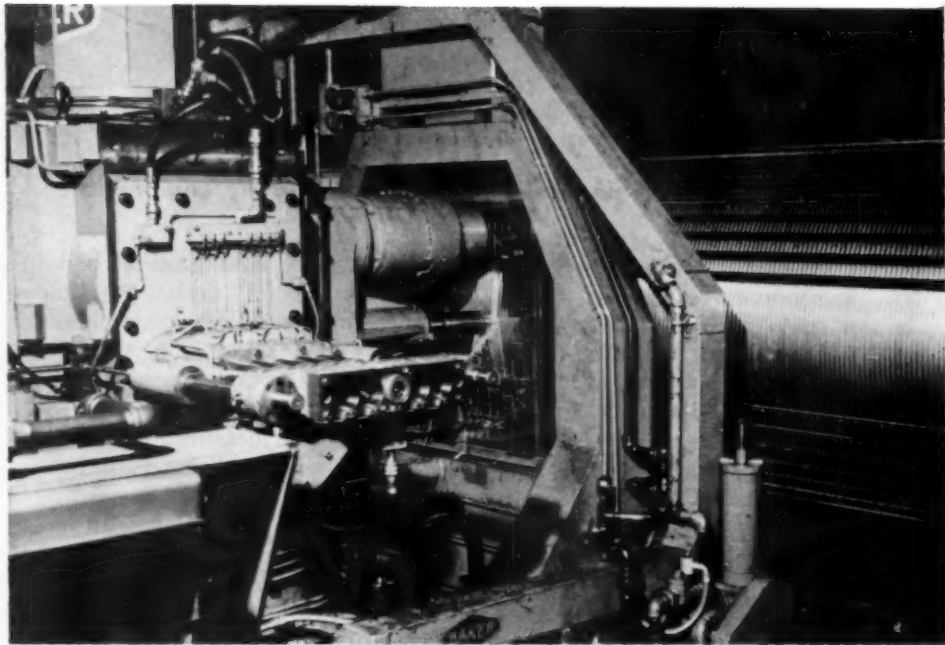
interpolates and transforms the digital data information on velocity, time and directions on a 1-inch magnetic tape. This one-inch tape, with its continuous tool path information operates through the machine's control system to direct the machine.

In setting up the work piece, the operator uses a blank forging which has locating points machined on it. The surface of the vane is cut to dimensions required. The root of the bucket is later milled in another operation.

Baker Bros. Drilling Machine with 4-Faced Turret

Discrete positioning numerical control from the viewpoint of the special machinery builder, such as Baker Bros., Inc., is a powerful mechanism he can apply. It might be thought of as an entity in the same terms that a machine designer now considers such components as cylinders, cams, ways, etc.

This mechanism of numerical control, when applied to special machine designs allows the manufacturer to do a better job in several ways. The present package systems now available in this country and Canada, when applied to machines, free the operator from constant reference to information stored in the form of drawings or tabulations. The information is stored on cards or one



Drilling, reaming, milling, as many as 2700 holes in rotors up to 90 tons and 24 feet long for large steam turbine-generators is the task of this tape-controlled Baker Brothers machine just installed in the General Electric Company's Large Steam Turbine-Generator Department. Holes can be drilled singly, as here, or five at a time.

inch paper tape. While practically all drawings are checked by human checkers, and tabulations can be checked and double checked, these are still written symbols that are being dealt with. The advent of the verifying machines for checking tapes or cards assures a new high in the accuracy of checked input data. This is possible, first, because the information is stored in the form of holes instead of written symbols, and secondly because the verifying machines stop and don't let the operator proceed beyond the point where there is a different input, with the difference clearly indi-

cated. When verified tape is put on a machine tool, it is pretty well established that the information going to the machine is accurate.

If a drilling machine has a large number of functions to perform, the operator has to either remember or make reference to a large number of instructions. Thomas L. Hollenbeck, special project engineer for the Baker Bros., Inc., points out for example, that if on the Baker Rotor Drilling Machine, this information were in conventional drawing and tabulation form the operator would first have to move the saddle to a linear posi-

Eliminated: mechanical cams and all their complexity

tion. He would have to check how many tools he needed; he would have to check the point at which he would put the unit into feed, check the point at which depth would occur, and check how many operations there were in each hole. Then he would have to watch indicating devices to see when the various positions had been reached and he would have to make adjustments so the proper functions would occur at each point. Or he would have to set cams and rate control devices. Because there are 2700 holes on some parts, the operator is spending a good deal of his time merely setting in instructions. The nearer he comes to having finished a part the more carefully he double checks his operations, until his productive rate becomes practically zero near the end. The tape and its transcription devices know no fatigue, no nervous worry over where they are and keep on at a steady pace.

A better information transmission job is accomplished with information in the form of punched holes. A second machine design advantage is mechanical simplification in a number of instances.

Precision feed back devices, capable of being applied to various motions, such as precision racks,

ball screws, and glass etched inductive scales make the linear measuring problem relatively easy. These feedback units may be adapted to a special machine design in the same manner that cam rails or precision measuring bars are at present. In addition, continuous feed back devices which compare the position of slides with command information from tape or cards act effectively to eliminate mechanical cams and all their complexity. This greatly increases flexibility of motions. For example, a hydraulically moved slide can be equipped with a relatively coarse precision rack and the hydraulic valve shift points, normally obtained from cams, can be made at a very large number of points in a large number of patterns. For a required motion of 30 inches, and with the resolution of the feedback device at .005" there are 6000 possible command positions of forward and reverse. These can be at any velocity wanted.

Mr. Hallenbeck cited a possible application of numerical control which Baker Bros., Inc., have under consideration. The potential customer produces long plates which need multiple patterns drilled in them. Permutations and combinations of various plates show that it will be necessary to

remove
up
to
25%
more
metal
every stroke

with the "Magicut"
All-Purpose file

If you're filing metals with a file that isn't called "Magicut" and doesn't have a Nicholson or Black Diamond trademark, please read on.

By changing to this file, you can cut metal filing costs as much as 25% compared to the next most efficient file for the same metal. The extra efficiency comes from the unique tooth pattern. The "Magicut's" teeth are on an extreme angle. They're termed "penetrating-planer" type teeth. As the name suggests, each stroke takes a deep bite and leaves a smooth surface.

To get faster results at lower costs, change from conventional machinists' files to the "Magicut." Use it on magnesium, copper, carbon steel and most other industrial metals. We believe you will see dramatic results. Ask your Nicholson or Black Diamond file distributor to demonstrate. Try it yourself.

** Industrial Distributors provide the finest goods and services in the least possible time. Our products are sold exclusively through them.*

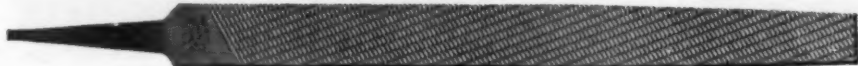


NICHOLSON



NICHOLSON FILE COMPANY, PROVIDENCE 1, RHODE ISLAND

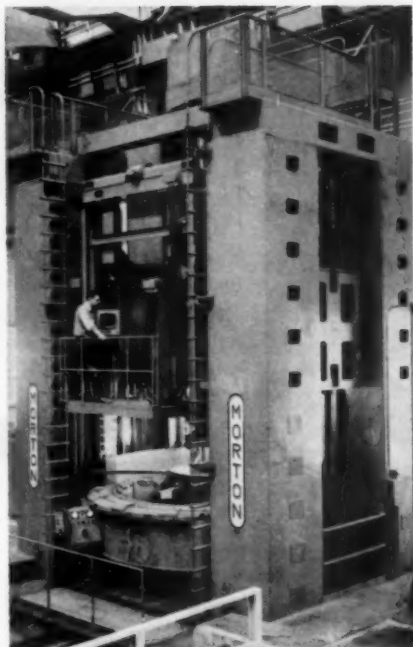
Files • Rotary Burs • Hacksaw and Band Saw Blades
Ground Flat Stock • Industrial Hammers



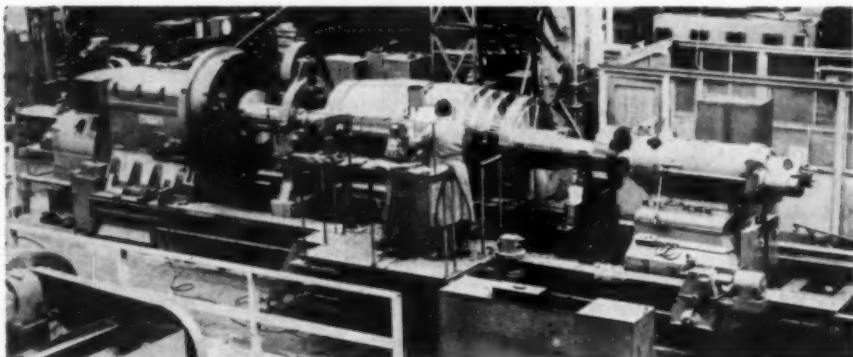
NUMERICAL CONTROL continued

stop the slide in approximately seventy different positions.

The cam rails for such a problem would make a stack about three feet thick. For every new part a new cam rail would have to be created. With numerical control, however, this can all be controlled from a feedback device and a tape. In addition, stored information can be provided for the depth to which the heads should drill, as well as providing other auxiliary information. This greatly simplifies the mechanical equipment on this machine at a cost of less than \$10,000 for the numerical positioner. When this is reduced by the equipment left off the machine, and the other advantages are considered, this appears a profit making place to apply numerical control. • • •



A closed-circuit television system monitors the high-speed removal of tough metal from 20-ton turbine shells by a huge, four-story vertical boring machine.



This turbine rotor, being grooved on Betts lathe with Carboloy disposable inserts, weighs 34 tons and is 19 feet between lathe centers.

AUTOMATIC COMPENSATION FOR MISALIGNMENT WITH EMPIRE FLOATING TOOL HOLDERS AND TAP HOLDERS

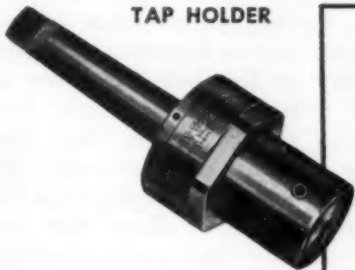
Check These Exclusive Empire Floating Tool Holder Features:

- Automatically compensates for both angular and parallel misalignment.
- Eliminates bell mouthed and over-sized holes—permits extremely close tolerance work.
- Free and easy movement . . . tool holder sleeve and shank float independently of each other.
- Amount of float is infinitely adjustable.
- Smoother running . . . moving parts ride on rollers.
- Minimum of maintenance . . . holder has only five parts.

TOOL HOLDER



TAP HOLDER



Standard equipment with leading Machine Tool Manufacturers. Tool Holders and Tap Holders are available with either straight or tapered shanks.

Check These Exclusive Empire Floating Tap Holder Features:

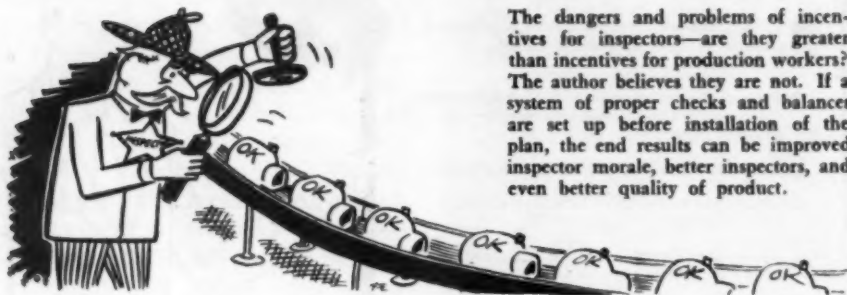
- Automatically corrects parallel and angular misalignment.
- Designed to prevent freezing under tension—taps float in and out.
- Wide range of float—simple adjustment lock-nut provides accurate control of degree of float.
- No springs or pivot members to restrict float.
- Floatation feature makes it easier to hold close tolerances.

EMPIRE TOOL COMPANY

11501 LAMBS ROAD • MEMPHIS, MICHIGAN

Use postpaid card. Circle No. 285

Should Inspection Jobs Be Put on Incentive?



The dangers and problems of incentives for inspectors—are they greater than incentives for production workers? The author believes they are not. If a system of proper checks and balances are set up before installation of the plan, the end results can be improved inspector morale, better inspectors, and even better quality of product.

By **Harold R. Nissley, P.E.**
Consulting Engineer

● Ten years ago, as a consulting engineer for the General Electric Company, I was counselling General Electric Works Managers to go easy on putting their inspection jobs on incentive. Today I am giving the opposite advice to smaller company clients.

What has happened in the last ten years to cause me to change my thinking on this matter? Nothing, beyond the fact that I am now ten years wiser than I was in 1949!

The arguments I advanced to my General Electric conferrers ten years ago are the same arguments that are used by many today in discouraging incentives for inspec-

tion jobs. These arguments are:

1. *Quality suffers when inspectors are put on incentive.* A partial answer to this belief is given in this question: How much does quality suffer when a shop goes from day-work to piece work? Obviously very little, judging from the large number of shops that are on incentive and are competing, quality- and price-wise, with day-work shops.

2. *Inspection jobs on piece work result in too many arguments.* Do the arguments from such jobs stem primarily from piece work misunderstandings or from poorly defined quality standards (e.g. "good finish"; "smooth threads")? Indeed, even when quality stand-

ards are well defined, changes in market conditions and customer reactions vary so widely at times that acceptable merchandise one year might be wholly unacceptable the next year—using the same physical standards.¹

How can you insure consistent quality, if inspectors are on incentive?

The question of putting inspectors on incentive does not arise until and unless production piece workers earn from 20% to 50% above their base rates and the pressure builds up for inspectors, frequently in the same labor grade, to share in these high incentive earnings. This management (and

union officers) have a problem on their hands, if they continue to pay inspectors from 17% to 33% less than the average earnings of production workers whose work the inspectors check. Indeed, the lower earnings of inspectors may put them at a psychological disadvantage when dealing with production workers and supervisors.

Before a company embarks on a plant-wide incentive plan of any kind, it must set up the proper quality control checks. And when an incentive plan is extended to the inspection department, the same care and judgment must be exercised in setting up checks and balances that are used on incentive production departments. This care

¹This suggests an old problem: When is a product over-engineered (i.e., when are the tolerances and other specifications too tight for practical end-product use)? Seldom is the answer to this problem ever known as well as in the following true story (told the writer by the president of an automobile supplier):

"Our equipment is old and only in fair repair. This usually limits us to wide tolerances of plus or minus 0.005 inches. Despite these tolerance limitations, we bid on a big automobile job that called for tolerances of plus or minus 0.001 inch. There is only one shop in the country that can manufacture this part to plus or minus 0.001 and he knows it. His bid was, therefore, much higher than ours—and we got the job. The best we could do on this part was plus or minus 0.003 inches. With our fingers crossed we started shipments. Six months passed; finally one day we received a letter: "Your last shipment was a trifle over-sized. Please take a little more metal off the stuff you send us in the future."

For ethical and practical reasons the writer is not recommending this procedure as good operating practice. I recite the story here to illustrate what happens with the passage of time (interval between bid date and delivery date) and/or what happens when buyers do not check their own specifications carefully before putting them out for bid.

There are many variations of the three basic incentive

and judgment may manifest itself in several ways, as indicated below.

Just as there are many types of production incentive plans, so there are many kinds of plans for incentives for inspectors.

The plan that is selected for a particular inspection activity will depend on a number of local plant variables. The following plans should, therefore, be taken as starting points for local management thinking in developing an incentive plan best suited to local conditions.

1. CONVENTIONAL PIECE RATE PLAN BASED ON WORK MEASUREMENT. The procedure here is similar to that of establishing piece rates for production workers. Indeed, "inspect" is frequently one of the elements of a production worker's task and is included in the time study calculations. Thus, as the number of "inspect" elements increases, a production worker becomes a quasi-inspector and the job is frequently called: "inspect and adjust."

But because an inspector's earnings under incentive conditions would depend solely on the number of units that passed his scrutiny during an 8 hour period, there would be a tendency for some incentive inspectors to do superficial inspection and pass many marginal

and defective parts—unless subsequent day-work inspectors spot-checked their work.

2. PIECE RATE PLAN BASED ON THE NUMBER OF CULLS OR REJECTS FOUND. Although such a plan overcomes the foregoing objection of allowing defective parts to slip by due to superficial inspection, this second plan has at least two objections to it:

(a) Like the traffic cop whose income is paid by the number of arrests he makes, the inspector whose income depends on the number of defects he finds is apt to come up with too many minor and imaginary defects, which may result in a high percentage of rework or scrap and/or frequent acrimonious debate. This latter is especially true where production workers are given credit for good parts only.

(b) But there is another reason, equally compelling, for discarding the plan of paying inspectors wholly for the number of defects they discover: Where materials, machines, and specifications vary widely from one period to another, the number of defects may vary greatly from one period to another. Thus, where this wide fluctuation in quality does occur, an inspector working on a defect discovery incentive plan would find that his incentive earnings were geared to factors outside his own control, in part at least.

3. COMBINATION PLAN BASED ON (A) NUMBER OF PARTS INSPECTED AND (B) NUMBER OF DEFECTS DISCOVERED. Under this plan an inspector is paid a regular piece

plans for inspectors

rate on the number of pieces he inspects; this piece rate is supplemented by another incentive premium based on the number of culls or scrap the inspector catches.

Example: Suppose the date rate for a grade 4 production worker is \$2.00 an hour and the contract calls for a 30% piece work differential for incentive operators putting forth good (normal) effort. Assume that an inspection job in this factory is a labor grade 4 job, too; as a grade 4 job the base rate will be \$2.00 for inspection. Suppose the scrap or defect rate ranges from 1% to 10%, the median being 5%. An equitable incentive plan might be established that would yield a 15% bonus for total pieces inspected and another 15% bonus for a 5% scrap or defect discovery. Thus, a normal incentive inspector, while working under normal conditions (5% scrap), would earn \$2.60 an hour, the same as the normal grade 4 production worker working at incentive (normal) pace.²

In practice today there are many variations of these three basic plans.



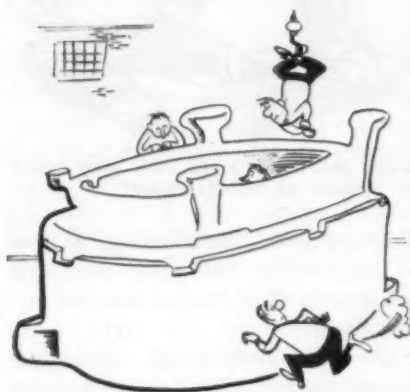
What about the piece rate plan based on number of rejects found?

Two are worth mentioning by way of illustrating the plans and the safeguards that have been set up for them.

Case A: Automobile Accessory Manufacturer. This company used Plan 1 above (conventional piece rate plan based on work measurement). To insure a good job of inspection, the company established a six-month bonus system based,

²Although a 50-50 split in the incentive premium is suggested in this example, this does not mean the writer favors such a split in all situations. But when radical departures from this 50-50 split are made, one must be prepared to get different results from those originally envisioned. For example, if the incentive premium above had been split on a 90-10 basis (i.e., 90% for total pieces inspected and 10% for defects discovered), there might be a tendency for inspectors to forget about the 10% discovery bit and go after the "pay dirt" (by passing nearly everything to boost the total pieces inspected where 90% of the incentive premium lay). Under such circumstances it would be easy to assume that "since we installed our incentive system for our inspectors, our scrap has gone down to less than half."

inversely, on customer complaints that could be charged to inspection failure. By way of illustrating this case, let us use the same figures used previously: \$2.00 base rate plus 60c an hour for incentive premium based on total units



Inspecting large castings on incentive has its problems.

inspected by a normal inspector. Suppose, further, that prior to the introduction to the inspection incentive plan, customer rejects or returns were 2%. Two per cent, then, becomes the six month target (to keep below). For each 1/10 per cent below this figure the inspectors achieve, a 1% bonus is given at the end of six months. Thus, if chargeable customer re-

turns or adjustments are cut in half, the semi-annual bonus is 10% (based on total previous six months earnings).

CASE B: LARGE JOB SHOP ALUMINUM FOUNDRY. This company turns out a wide variety of castings—from a few ounces to hundreds of pounds; and from simple castings to engine blocks. An inspector with a black crayon stands at the end of a conveyor belt and circles the defects he discovers; these defects are subsequently corrected (if possible) and a final spot inspection is made by another inspector to learn if all the defects in most of the castings have been corrected.

The weight and shape of these castings vary considerably from one day to another. Obviously, it was highly impractical to work out a time standard for each size and shape of casting handled. So the company worked up a table of standard time data based on random samples and geared these times to casting weight (in one pound increments), because weight was the most significant variable—the higher the weight, the more time it took an inspector to turn the casting around and inspect it for six types of defects.³

³Castings weighing over 50 pounds did not come down the conveyor but were trucked to the inspector. Portable hoists and other gear were used in manipulating these castings. Obviously, this took much time.

110 volt **LIGHTING** **WHERE YOU NEED IT!**

Dimensions
10" x 6" x 5"
Rugged cast.—
weight 15 lb.
150 VA Capacity



©1959 Mullenbach Division

POWER
PSP
STEPDOWN
PACKAGE

**Converts 220 or 440 volt to 110...
for convenient, easily installed,
safe work lights at the machine.**

Utilize your 220- or 440-power lines quickly, easily, safely, reliably, for supplementary lighting needs—or for small power hand tools. The P/S/P POWER STEPDOWN PACKAGE is a clean-cut compact unit that introduces Safety and Economy into the problem of delivering added light to the machine operator's work.

SAFETY—Contains built-in circuit breaker (on-off switch) on the 110 V. circuit; plug-in outlet; no exterior wiring; eliminates need for improvising dangerous 110 volt lead-in extension cords; proper light speeds work, cuts rejections.

ECONOMY—Low first cost permits widespread use; simple installation by unskilled help; current is drawn at power rates.

SEND FOR LITERATURE, QUOTATIONS AND NAME OF NEAREST DISTRIBUTOR

Electrical Equipment Department



Mullenbach

DIVISION

ELECTRIC MACHINERY MANUFACTURING CO., 2100 E. 27th Street, Los Angeles (Vernon), Calif.

Use postpaid card. Circle No. 286

The weight of the castings handled in one day is divided by the total castings inspected during the day to get the average weight of casting handled during the day. The time value opposite this average weight in the standard data table is then multiplied by the total number of castings handled during the day to get the total allowed time credited to the inspector. This total time is then multiplied by the base rate of the inspector to get the inspector's total earnings for the day.

From these two intricate cases and previous remarks by the writer, the reader may get discouraged at trying any kind of an incentive plan for his inspectors. Before giving up, however, the reader should bear in the mind the alternatives to incentives for inspectors: (1) Adding to your inspection force (at several times \$2.00 an hour per inspector due to fringe benefits and company overhead). (2) Putting up with poor inspection even under day-work conditions. (3) Accepting the high turnover of inspectors who bump into higher paying production jobs on incentive.

IN CONCLUSION: The dangers and problems of incentives for inspectors are no greater than the dangers and problems of incentives for production operators. Just as tighter and better controls are necessary

to maintain quality specifications when production operators are put on incentive, so greater care must be exercised when inspectors are put on incentive. But this greater care and trouble is usually justified, in the writer's opinion, because of improved inspector morale, better inspectors, and even better quality of product (if the plan is tailored properly to suit the particular inspection needs of a company and its customers).

But before you install an incentive plan for your inspectors, be sure you have set up a system of checks and balances so that you do not end up a year later disillusioned and unhappy. Surely, however, any system of checks and balances is to be preferred to hiring additional inspectors who are bound to cost you several times their hourly rate (if you include their fringe benefits and your overhead). And to limp along with insufficient inspection may cost you untold amounts in customer goodwill—an item you may be spending 5% to 10% of your sales dollar to develop, and which can easily be destroyed with even slightly defective merchandise. • • •

(Author's note: The writer would like to acknowledge his gratitude to four of his industrial engineering friends for their suggestions and help on parts of this article: Tom Banta; John Petro; Charles Taylor; and to Harold Thomas Nissley).

Ask for this
**HYDRAULIC
PRESS BRAKE CATALOG**

Get the facts on the Steelweld Line of quality-built, accurate, smooth-operating Hydraulic Press Brakes. Available in capacities to 2000 tons.

Learn about the many fine features that will speed production and cut your costs.

*Write for
Free Catalog
No. 2024*



MECHANICAL PRESS BRAKES

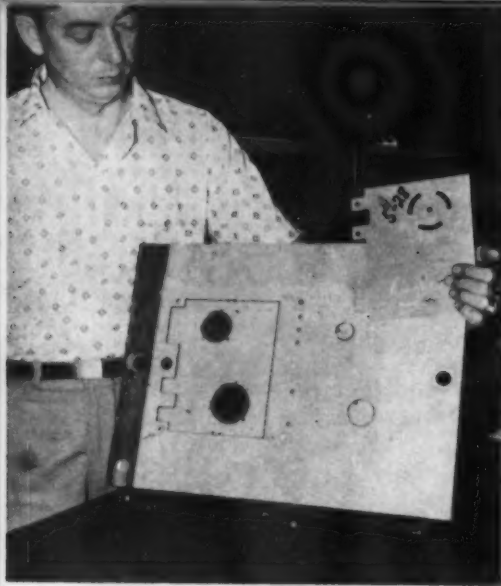
For data on Steelweld Mechanical Press Brakes, ask for this free highly illustrated 52-page catalog—No. 2023.

STEELWELD
Mechanical and Hydraulic
PRESS BRAKES

Steelweld Machinery includes: Mechanical & Hydraulic Shears and Press Brakes, One-, Two- and Four-Point Straight-Side Presses, Speed-Draw Presses.

THE CLEVELAND CRANE & ENGINEERING CO.
5276 EAST 281st STREET • WICKLIFFE, OHIO

Use postpaid card. Circle No. 287



A progressive die in which the part shown is produced in two operations.

The acquisition by Sheridan-Gray, Inc., Torrance, Calif., of the Sarno Precision Blank and Pierce Process is filling a need for a low cost tool service on the West Coast. The patented process represents 20 years refinements over the basic concepts of Steel Rule Die Blanking and is reported to be the pioneer of other blanking processes. Normally, this firm builds the die, produces the parts and completes deliveries within 10 days from receipt of the purchase order. Costwise, the break-even point on such orders, as compared with the cost of producing the parts by routing, nibbling, band sawing, stack drilling, etc., is (typically) six titanium or steel parts or 10 aluminum parts.

By **William D. Engstrand**
Western Editor

Refined Steel Rule

Here's the "how" and "why"

- Now available to industry is a precision blank and pierce process that offers an excellent opportunity to produce many sheet metal products hitherto avoided because of excessive tool costs; it will also lower the cost of other sheet metal products at no sacrifice in product quality.

The accompanying photographs describe the dies, show how they are built, and indicate their versatility and the great number of forms and configurations which can be made. The photographs also illustrate the economic feasibility of this greatly simplified tooling process.

The new dies can blank and pierce aluminum up to 3/16-inch thick, mild steel up to 1/8-inch, stainless steel up to .090-inch, and titanium up to .112-inch. On aluminum, the dies can blank and pierce in excess of 100,000 parts without deterioration of quality. Holes as small in diameter as the thickness of the material can be effectively pierced.

While die costs are highly relative, the cost of this precision die is always many times less than that of a hard die tool to produce the same part. Typically, if the

Die Blanking Process Cuts Costs

of a new and greatly simplified tooling concept

cost of a hard die tool is \$250-\$300, the cost of a Sheridan-Gray die in many cases will be about \$15-\$20. In one case where die amortization cost alone was 40 cents per part using a hard die tool, the parts were produced and delivered to the customer at a total cost of seven cents each, using this blanking process.

Normally, the dies are built to hold typical aircraft tolerances.

However, it is entirely possible to build a die that will hold plus-or-minus .005-inch between hole centers, plus-or-minus .010-inch of the periphery, and plus-or-minus .002-inch on hole diameters. This makes them adaptable to most types of chassis work where dimensions must be held within critical limits.

The dies are not limited to blanking and piercing in a single plane.



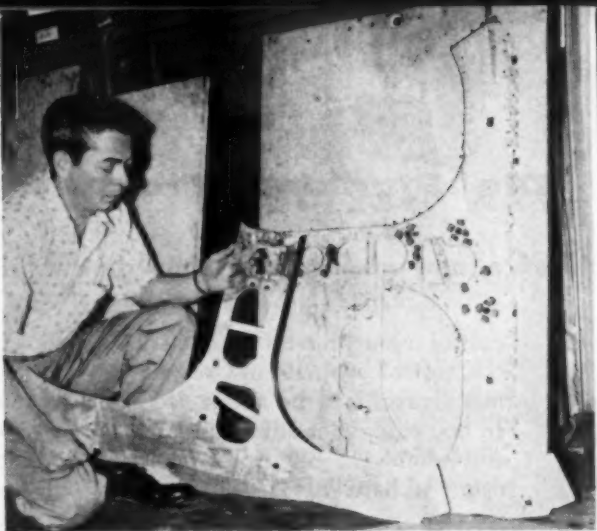
Here a saw kerf is being sawed in a piece of plywood into which the formed metal tool strip conforming to the configuration of the part to be blanked will be inserted.



Metal strips are being inserted in the saw kerf. Piercing punches are merely inserted in accurately drilled holes in the plywood. Entire die is backed by a sheet of metal.

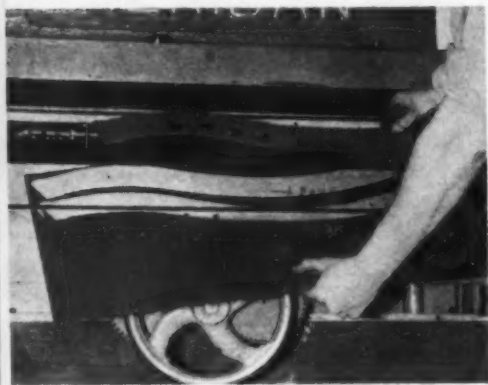
BLANKING continued

A rather complicated die for a large part, along with the part it produces. Note small rubber pads glued to die surface which eject part after blanking.

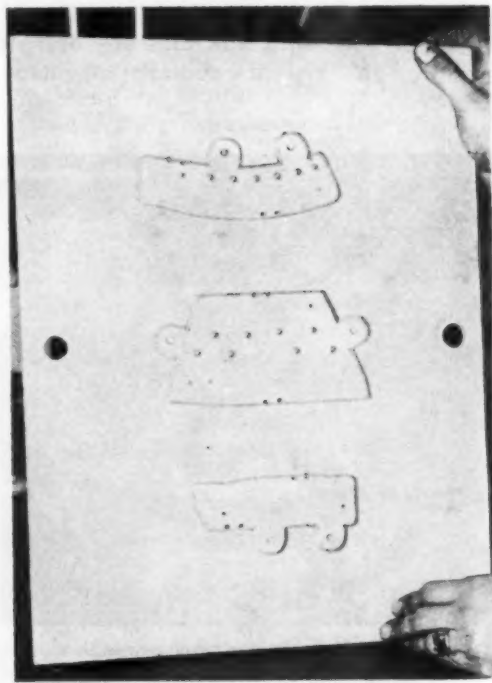


They may be used to blank and pierce parts having several parallel planes; for example: beaded panels, hat sections, etc.

A great advantage of the die is its adaptability to engineering changes. Hole relocation, changes of periphery design, etc., can be accomplished in a minimum of time



Prototype part comes out of the press when checking out a new die. De-burring is seldom required.



A gang die for blanking several different parts at the same time.

and minus the often very high costs, both in time and money, of reworking a hard die tool.

The advantages held forth to industry by these dies are many and diverse, and have already been illustrated in many typical cases. Tool costs which approach the vanishing point with the Sheridan-Gray dies make it practical to produce many sheet metal product designs which were formerly shelved simply because the tooling costs were too high. These same low tool costs lift short run production into the profitable category.

Many companies, especially those in the aircraft and missile categories, often require sheet metal parts in a hurry. Here again, the Sheridan-Gray company steps into the breach, and at no cost penalty. Sometimes very large or extremely complicated sheet metal parts are required which exceed the capacity of available press equipment. Simple and economical dies are built to produce such parts in stages well within press capacity.

Sheridan-Gray precision dies can be produced as simple blanking dies only, to blank and pierce in one operation, as progressive dies which blank and pierce in two operations, as step dies to blank and pierce formed parts in one or several planes, and as a gang die to blank and pierce several different parts at the same time.

• • •

LOOK FOR THIS SIGN



*for fast, dependable
service on*

- hand hack saws
- power hack saws
- band saws
- hole saws
- hammers
- ground flat stock

LOOK FOR THIS SIGN



*for fast, dependable
service on all your
industrial needs.*

*Patronize the Distributor
who displays both.*



THE CAPEWELL MFG. CO.
HARTFORD 2, CONN.

Use postpaid card. Circle No. 288

With 4 shopmade boring bars they are

Boring Large Diameters on Standard Engine Lathes

These 4 boring bars embrace novel features. Here's design information, particulars about feed and operation practices

By **Murray A. Young**
Shartle Division, Hamilton Plant
The Black-Clawson Company

● Boring roll shells, usually made of cast iron, and ranging in bore diameter from 12 inches to 60 inches and in length from 24-inches to 260 inches, is a common operation in the paper machine division shops of The Black-Clawson Co., Watertown, N.Y., and Hamilton, Ohio.

Diameters of boring bars used for this range of work are 6, 9, 12 and 18 inches. Although the four bars are similar in construction to the one shown in Fig. 1, (9-inch diameter) each size imposes certain limitations in chain sprocket and spur gear diameters to obtain an optimum feed range. For example (referring to letter designations in schematic diagram, Fig. 2), ring sprocket A will always be enough larger than the boring bar to encircle it. Spur gears E and F are of equal diameter on the two larger bars, but on the 6-inch and 9-inch bars, gear E is made larger than F to provide adequate journal strength to support the bar on the lathe tail-stock center. Thus, each size of boring

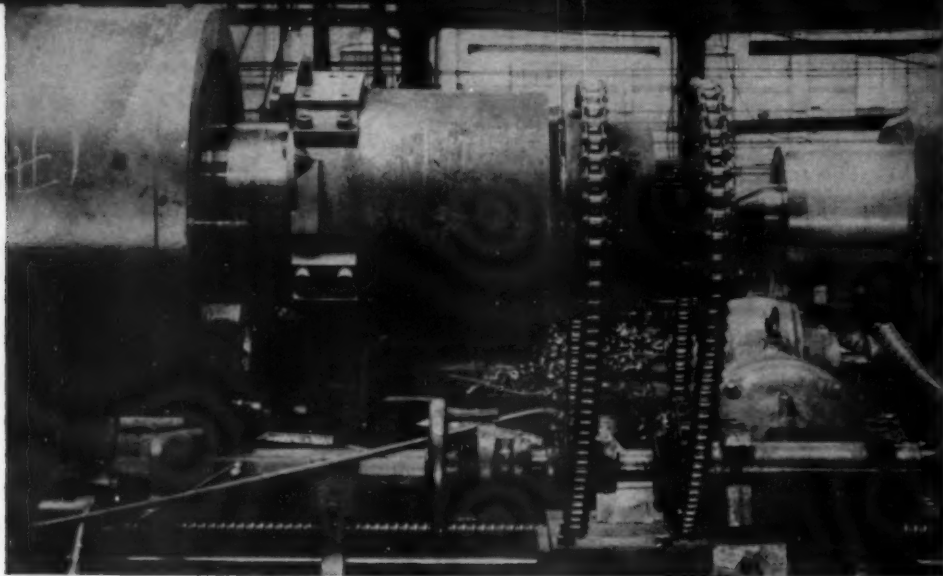
bar presents its own special sprocket and spur gearing requirements and the size of countershaft sprockets B and C will vary accordingly from one bar size to another.

The workpiece remains stationary during the boring operation, held by both the clamping action of the steadyrests and a heavy C-clamp on the chuck end of the workpiece. The clamp is fastened to the shell after the steadying rings have been put in place. The C-clamp is stopped against a wood block setting on the front way of the lathe.

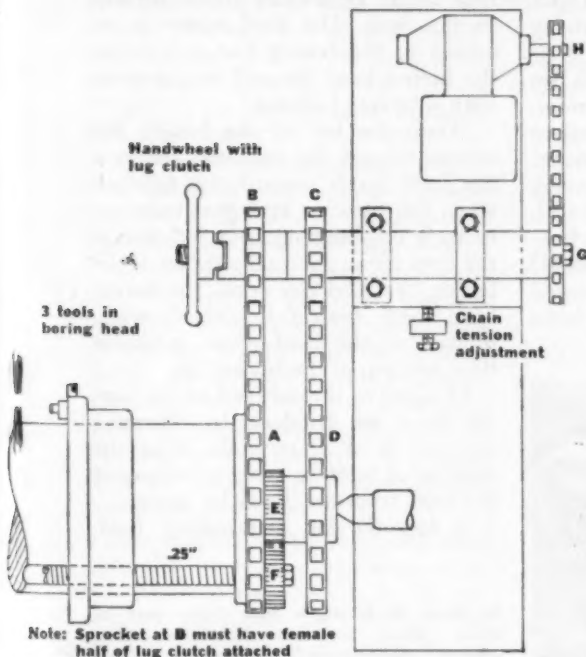
Datum bores, about four inches long, are made to drawing size in each end of the shells by conventional methods as a part of the first or preceding operation. The tool is set to this size by an adjusting screw at the bottom of its slot in the boring head. The datum bores thus save time in starting the cut and make it possible to use the steadying rings at the beginning of the cut. On large work, such as paper dryer shells, the datum bore is made in the starting end only. Occasionally, special design features make it necessary to make the datum



Note:



1. View of 9" boring bar from front of Monarch 2501 Series 90 lathe.



2. Feed and rapid traverse mechanism for 9" boring bar used on Lathe No. 389.

Boring head traversed rapidly by driving feed screw with gear motor as shown in arrangement at left. Formula for rapid traverse in inches per minute (using sprockets shown in sketch at left):

$$\begin{aligned} & \text{Gear mtr HCEL bar rpm EL} \\ & \quad \times \quad \div \\ & \text{output rpm GDF} \quad F \\ & \quad 135 \times 16 \times 24 \times 43 \quad 0 \times 43 \\ & = \frac{24 \times 40 \times 16 \times 4}{16 \times 4} \\ & = 36 \text{ inches per minute (approx.)} \end{aligned}$$

This speed may be varied by rotating boring bar in either direction during traverse. Example is for boring bar not rotated during traverse and sprocket C having 24 teeth.

Roll shells for paper, glass and steel making are made of gray

cut with the boring bar itself.

The datum bore sizes are within $-.005"$ of each other, and are easily held to this tolerance through the entire length of the workpiece. Actually, if necessary, the bore dimension can be held within $.003"$ to $.005"$ and is done routinely for a center section of the shell where shrink fit contact is made with the roll core body.

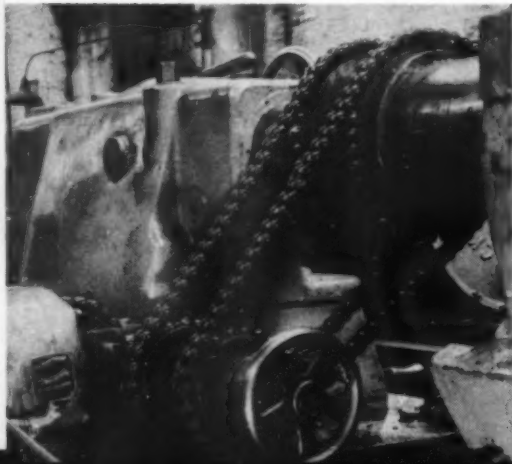
Some design information which follows applies to the entire group of boring bars and also refers to Fig. 2 for identification of sprockets and spur gears. Ring sprocket A is the driving source for the feed mechanism. It is secured to the boring bar with set screws and has a predetermined number of teeth, selected in convenient relationship to boring bar diameter. By means of a roller chain (having $\frac{5}{8}$ -inch diameter rollers and 1-inch pitch) it drives sprocket B, free-turning on a countershaft supported in pillow blocks which are mounted on a steel plate bolted to the lathe

bed just ahead of the tailstock. The plate can be moved in or out to provide chain tension adjustment. When the feed is to be engaged, sprocket B drives the countershaft through a handwheel-operated lug clutch as shown in Fig. 3. Sprocket C is keyed to the countershaft adjacent to sprocket B and by a second roller chain drives the hub-joined sprocket D and gear E unit which is free-turning on the boring bar journal. Gear E drives gear F which is keyed to the end of the feed screw having four single right-hand Acme threads to the inch. The feed screw is recessed in the boring bar and drives the boring head through engagement with a bronze half-nut.

When the top of the boring bar rotates toward the operator, the boring head feeds toward the tailstock when the sprocket and gear train are in such combination that rotation of the feed screw gains on rotation of the boring bar. And vice versa, the boring head feeds toward the chuck when rotation of the feed screw is slower than rotation of the boring bar.

Changes in rate of feed of the boring head are obtained by changing sprocket B or C or both, since the number of teeth in other members of the feed train are fixed by design.

A formula for determining feed,



3. View of tailstock end from rear of lathe: Ring sprocket, handwheel lug clutch, countershaft sprockets, rapid traverse motor and feed gear sprocket.

iron, ductile iron and steel

using a typical arrangement of sprockets, gears and feed screws, may be generally expressed as follows:

$$f = \left[\left(\frac{ACE}{BDF} \right) - \frac{E}{F} \right] L$$

Where f = feed of boring head in inches per revolution of boring bar

A, B, C, D = number of teeth in sprockets

E, F = number of teeth in gears

L = lead of feed screw in inches

In practice, it is simplest to make sprockets A and D with the same number of teeth, and gears E and F with the same number of teeth, since the ratios of these pairs will then be in unity in the feed formula. In the 9-inch bar illustrated here, however, design limitations made only part of this simplicity practicable; namely, sprockets A and D have 40 teeth each. Gear E has 43 teeth, or a large enough diameter to allow adequate journal size on the end of the boring bar, and thereby, as mentioned earlier, provide adequate support in the tailstock center. As a result of this minimum size limitation of gear F, its mating gear E must be made smaller, or with 16 teeth in this instance, to comply with the fixed center distance between the two gears.

Before following through with some examples of feed determination for the 9-inch boring bar, it is convenient to re-express the general feed formula in terms of sprockets B and C, which, like the change gears in an old-fashioned lathe, are responsible for

feed changes. Both of these sprockets are made changeable because we are dealing with 1-inch, or relatively large, circular pitch sprockets, and a change of only one tooth in either of these sprockets may cause a greater change in feed than is desirable. For the same reason, it is understandable that available changes in sprocket B or C or both might result in approximations of feed values arbitrarily preselected.

The general formula expression in terms of change sprockets B and C requirements for any desired feed f may be written:

$$\frac{C}{B} = \frac{\frac{f}{L} + \frac{E}{F}}{\frac{AE}{DF}}$$

Substituting given values for the 9-inch bar design:

$$\frac{C}{B} = \frac{\frac{f}{\frac{1}{4}} + \frac{43}{16}}{\frac{40}{40} \times \frac{43}{16}}$$

which reduces to:

$$\frac{C}{B} = \frac{4f + 2.6875}{2.6875}$$

It might be of interest to note at this step that if the pair of spur gears E and F have the same number of teeth as do sprockets A and D, with 40 teeth each, the formula for change sprockets B and C simplifies to

$$C = 4f + 1$$

B

Although accompanying photographs show that the boring heads are made with three tool holders, in actual practice only one tool, placed opposite the feed screw, is found to

BORING OPERATIONS continued

give best results. Typical cutting speeds for steel, gray iron and ductile iron, with carbide tooling, range from 100 to 150 feet per minute. Experience in boring steel shells has been limited, but for diameters under 20 inches, a feed of approximately 1/64-inch per revolution has given good results. Most ductile iron jobs fall under 30-inch diameters, where the feed most commonly used is about 1/32-inch. Gray iron shells usually run over 30-inches in diameter where a feed of 1/16-inch is most often used. In some instances on the larger gray iron diameters, where only a light clean up cut is needed, feeds up to 1/8-inch are used. A typical feed table for the 9-inch bar is:

0.000
0.0156
0.0312
0.0468
0.0625

An explanation of the first, or zero feed will appear later.

The following example shows solution of the formula for a 1/32-inch feed.

$$\frac{C}{B} = \frac{4(0.03125) + 2.6875}{2.8125} = \frac{2.6875}{2.6875} = 1.0465$$

A quick and simple way to find C and B simultaneously is by slide rule, setting the left index of the C scale over 1.046 on the D scale and finding whole numbers on the C and D scales that come nearest to coinciding and thus satisfying the equation. If sprocket diameters were of no concern, the number of solutions would be infinite, but we know from experience that we like to keep diam-

eters within practicable limits, say roughly, from 5 inches to 14 inches, or from 16 teeth to 44 teeth. We therefore examine our slide rule scales between 1.5 and 4.5, or in the 15 to 45-tooth sprocket range, and find that 21 falls almost exactly opposite 22; or at least as nearly exactly as it is possible to set the C index over 1.0465. Thus 22 teeth for C and 21 teeth for B satisfy the equation closely enough and give a very nearly exact actual feed of:

$$\frac{\left(\frac{22}{21} \times 2.6875 \right) - 2.6875}{4}$$

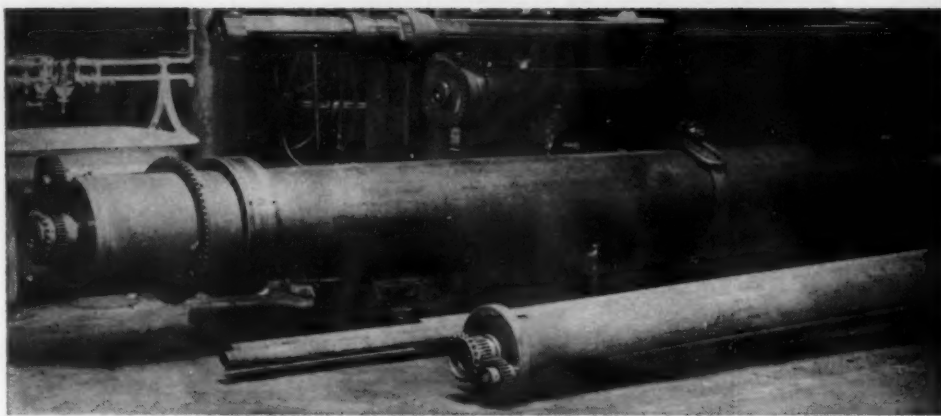
or .03198 inches per revolution of the boring bar.

For our purposes, the feed table is usually extended to include four or five valves for each boring bar, and given to the operator with a schematic diagram as shown in Fig. 2.

Although rotation of the boring bar and direction of cut may be reversed without affecting the amount of feed, there may be times when it is desirable to change the direction of feed without changing the direction of rotation of the boring bar; that is, start the cut at the tailstock end and feed toward the chuck. To do this, sprockets B and C must be selected such that the ratio of C to B is less than one. For example, assume that a feed toward the chuck end of about 1/32-inch is wanted. The formula to find sprockets B and C is then written

$$\frac{C}{B} = \frac{6.6875 - 4(0.03125D)}{2.6875} = 0.9535$$

with 20 teeth for C and 21 teeth for B satisfying the equation.



4. Entire family of boring bars used in the Hamilton shops of Black-Clawson is shown here. Diameters, top to bottom, are 6", 9", 18" and 12". Details of driving head, ring sprockets, feed screw gearing, lifting rings, boring head, etc., are apparent. The 6" bar is the only one having two feed screws. Wear rings, visible on 6" and 18" bars, are provided for additional support when space permits.

In solving for C and B by slide rule we find combinations that are close enough for practical purposes. It is difficult to read a difference between 20 teeth for C and 21 teeth for B and 21 teeth for C and 22 teeth for B. The first combination gives a feed of 0.03198 inches and the latter 0.03133 inches (approximately).

As shown in Fig. 1, a 2HP gear reduction motor is mounted behind the countershaft assembly and is used to rapid-traverse the boring head to its starting point. A 16-tooth sprocket (H) on the output shaft (135 rpm) drives a 24-tooth sprocket keyed to the end of the countershaft opposite the handwheel clutch, which is disengaged during rapid traverse.

A general formula expression for rapid traverse in inches per minute is:

$$\frac{\text{OHCEL}}{\text{GDF}} \pm \frac{\text{REL}}{\text{F}}$$

Where O = output rpm of gear reduction motor
H, C, G, D = number of teeth in sprockets
E, F = number of teeth in gears
L = lead of feed screw in inches

R = rpm of boring bar

Using the sprocket and gear arrangement illustrated for the 9-inch bar, and sprocket C selected for a 1/32-inch bore feed, the formula is:

$$\text{ipm} = \frac{135 \times 16 \times 24 \times 43}{24 \times 40 \times 16 \times 4} + \frac{0 \times 43}{4 \times 16} = 36 \text{ (approx.)}$$

Changes in traverse time as affected by different feed change sprockets C are shown in Fig. 5. The REL

term $\pm \frac{\text{REL}}{\text{F}}$ means that the return

BORING OPERATIONS continued

speed may be varied by rotating the boring bar in either direction during traverse. As in the example above, usual practice is not to rotate the boring bar during back-up, which

REL

causes the term — to become zero.

F

If boring jobs were consistently of short length, where no whipping vibration is set up from higher boring bar speeds, it would be feasible to eliminate the gear reduction motor and back up the head by simply rotating the bar counter-clockwise at a suitable speed (with lug clutch disengaged and countershaft stopped) using the formula:

$$\text{ipm} = \frac{\text{RCEL}}{\text{DF}}$$

For example, the 9-inch bar head could be returned at 36-inches per minute by counter-rotation of the bar at 54 rpm. An 18-inch bar (shown in Fig. 4), however, used on a 60-inch

CE

lathe has a — ratio of one, and would

DF

require excessive bar speed to return the head at a practical rate by this method.

Occasionally it is desirable to have the feed disengaged while starting a

cut—especially when bore dimensions are to be held relatively close, rather than nominal for clean-up and balancing purposes. Mechanically this could be accomplished by disengaging the lug clutch on the countershaft end to allow sprocket B to turn freely. Since the rapid traverse chain is left on sprockets H and G during boring, the load imposed by the gear reduction motor, although free to be driven idly in reverse, as in boring, is sufficient to impart feed to the boring head. Usual practice is to establish zero feed by such selection of feed change sprockets B and C that the ratio of C to B equals the ratio of D to A, or by formula:

$$\frac{C}{B} = \frac{(4 \times 0) + \frac{E}{F}}{\frac{AE}{DF}} = \frac{D}{A}$$

For the subject boring bar,

$$\frac{C}{B} = \frac{0 + 2.6875}{1 \times 2.6875} = 1$$

Or sprockets B and C may have any convenient equal number of teeth. For reference by the operator, sprocket values for B and C to give zero feed are included in the feed table in Fig. 2. . . .

Feed per rev. of boring bar	Sprockets		Feed per tool per rev. of boring bar	Rate of rapid traverse ipm
	B	C		
.000	22	22	0	33
.0312	21	22	.0104	33
.0468	30	32	.0156	48
.0625	22	24	.0208	36
.078	17	19	.026	29

FIGURE 5



Eclipse

CUTTING TOOLS

are

"Engineered for You!"

For almost half a century ECLIPSE has engineered and produced quality cutting tools. These years of leadership in the field guarantee the superiority and dependability of all ECLIPSE products. For longer tool life, finer finishes and better all-around performance, look to the symbol of perfection.



- H.S.S. CUTTERS
- T.C.T. CUTTERS
- CORE DRILLS
- BACK SPOTFACERS
- MULTI-DIAMETER CUTTERS
- INSERTED BLADE CUTTERS
- PORT CONTOUR CUTTERS

WRITE FOR CATALOG 51



ECLIPSE COUNTERBORE COMPANY

1600 BONNER AVE., DETROIT 20, MICHIGAN

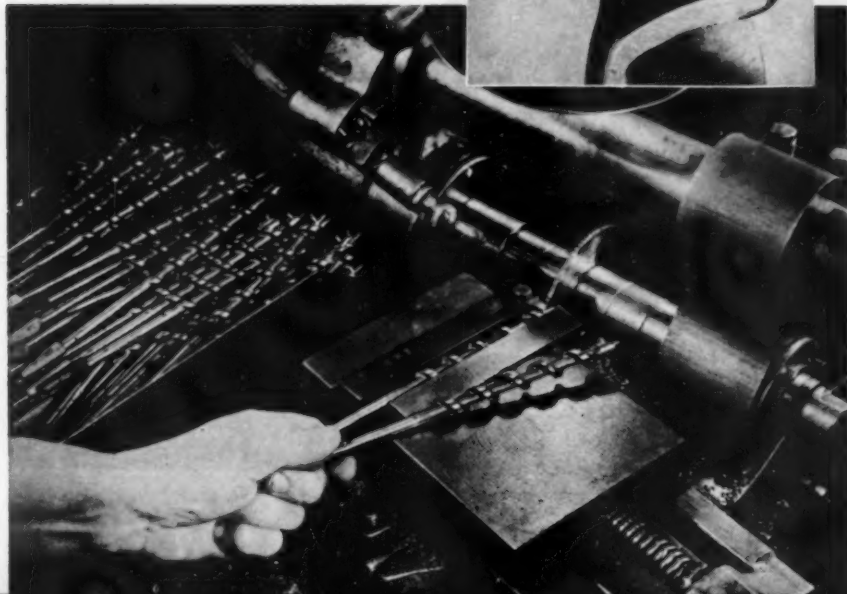
High Production Here With Hand



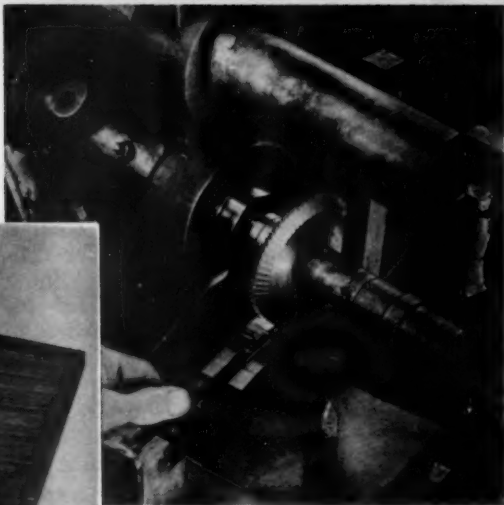
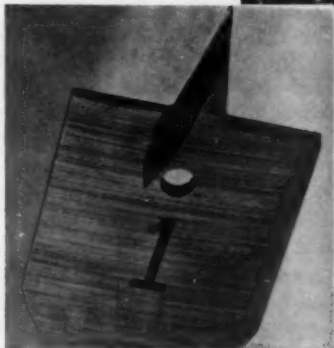
By **Paul A. Meline**
Managing Editor

● In these days of automation, it is customary to think that the only low cost avenue to a high production rate is via the mechanical, pneumatic or hydraulic feed route. Often, however, for quantity production of small pieces, remarkably high production can be achieved with hand fed machines. The Irwin Auger Bit Company of Wilmington, Ohio, manufacturers of a wide variety of wood boring tools, is an excellent example

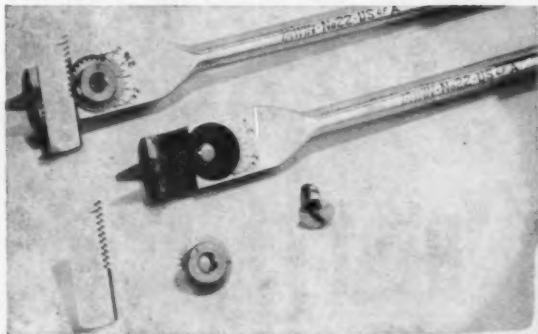
Solid center type bit with double cutters and extension lips have three operations performed by U.S. No. 1 hand mills forming the spur by plunge milling; end milling the cutting head to form the extension lips; the pitching operation between the point and the spur gives the pitch on top of the bit and forms the spur. Production rate is 300 pieces per hour for an average size bit.



Fed Machines



Spade type wood bits have cutting edges and point form-milled on a No. 1 U.S. Hand Milling Machine before being ground to correct thickness and angle. All bits have been forged in one piece from solid bars of special analysis steel.



Micro-dial expansive bits (above) are machined by a battery of seven hand mills in a production line at Irwin Auger Bit Co. plant. These operations include: rounding the ends; dovetailing one end; plunge cutting to start form of spur; finish cutting to get final dimension and finish spur; dovetailing second end; facing to get radius and forming to get radius. **Right:** set-up on a hand mill for cutting teeth of gear on expansive bit. The indexing head was designed by Irwin.



3 Irwin Production Lines Make Economical Use of Hand Mills

of a case where rapid hand feeding on milling applications is faster than automatic feeding. Even though these hand operated milling machines can be equipped with air or hydraulic feeds for high production applications, it appears that the operator's skill and the Irwin incentive pay plan are the controlling factors that make the 20 hand fed milling machines so adaptable to such operations as slotting, simple profiling, squaring, forming spurs, rounding ends, etc.

The hand miller with standard workholding devices is turning out tremendous quantities of work on those products where large produc-

tion is necessary. However, Irwin finds the hand miller an ideal machine for small lot operations, also.

Three production lines at Irwin that make economical use of hand mills are the solid center type auger bit, expansive bit, and spade-type bit lines. Most of the milling cutters are produced at the Irwin plant. The lever-operated tables make it possible for the operators to take milling cuts as fast as the piece can be locked and the lever moved. Some levers are situated so that the operator can move them with knee action, thus leaving both hands free to lock and remove the piece part faster. . . .

FAST, CLEAN, ECONOMICAL HEAT

Provides high, fast heat for metal bending, metal forging, occasional heat treating, metal forming and preheating. Clean, efficient, equipped with four burners. Two end burners have separate shutoff valves, may be turned off for smaller jobs. Operates economically on any type of gas. Convenient gas-air adjustment panel. Adjustable swinging refractory lid. Adjustable front rack to support long pieces and hold tools. Solenoid safety valve turns gas off automatically when blowers are turned off. High temperature, insulated firebox, 5½" by 7½" by 27". Maximum 425,000 BTU input. F.O.B. Factory \$246.00.

johnson
If it burns gas look to Johnson
Since 1901

Use postpaid card. Circle No. 290



**JOHNSON
NO. 133 FORGE FURNACE**

WRITE TODAY FOR FREE
JOHNSON CATALOG

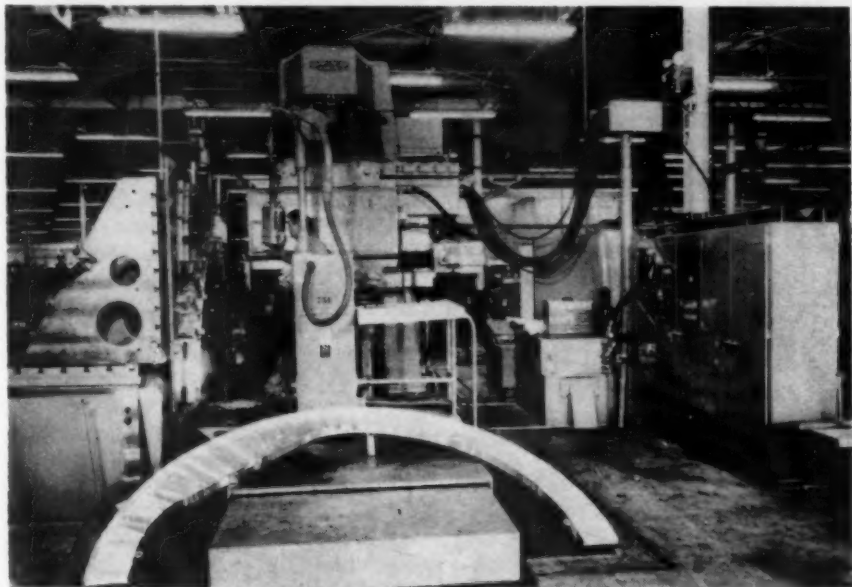


Johnson
Gas Appliance
Company
570 E Avenue
N.W.
Cedar Rapids,
Iowa

Tape Controlled Milling Cuts Costs on Atlas Bulkheads

● To reduce tooling costs, machining time and lead time in the machining of an Atlas ICBM thrust bulkhead, H & B American Machine Co., Inc., Indianapolis, Ind., utilizes a numerical control system that controls a Kearney & Trecker three-axis milling machine

during profile and pocket milling operations on the Atlas bulkhead. Developed and built by Industrial Controls Section, Bendix Aviation Corp. the numerical control achieves savings of 55 percent in machining time, 38 percent in tooling costs and reduces



Numerically controlled Kearney & Trecker three-axis profile milling machine used to machine the Atlas ICBM thrust bulkheads. Bulkhead is mounted on machine bed. Bendix numerical control system is at far right. Atlas thrust bulkhead is in foreground.

lead time 33 percent. Surface finish is improved over conventional milling in addition to the closer tolerances achieved and the elimination of operator error.

Milling operations are performed around the outside contour of the part, 36 pocket milling operations on the front side of the part and 15 pocket milling operations on the aft side of the part.

The rough-sawed 3-inch 7075-T6 aluminum plate weighs approximately 500 pounds before machining. The finish-machined bulkhead weighs 49 pounds, is 10-ft long and 5-ft high.

H & B process planners program the part and prepare the process sheet. Because H & B does not maintain a tape preparation system, the process sheet is sent to a Bendix tape preparation center in Detroit for preparation of a machine control tape.

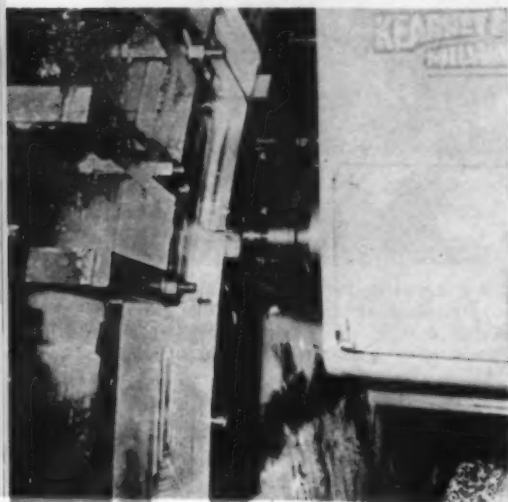
In the preparation of a control tape, punched cards are first prepared from the process sheet. The cards contain exactly the same information as the hand-written process sheet and are

produced by a standard IBM Key Punch.

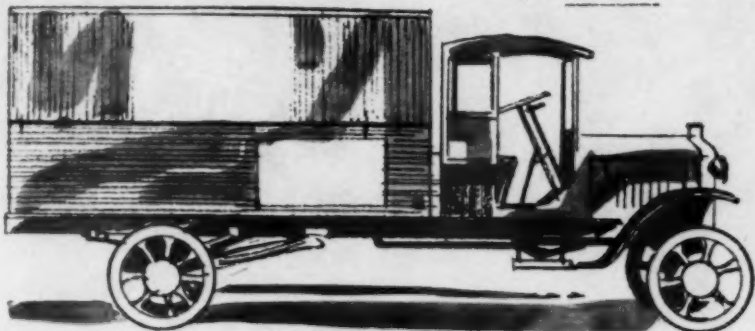
The cards are then checked for accuracy by inserting them in a card verifier. The information on the hand-written process sheet is retyped on the verifier. As each key is struck, the verifier checks the code on each card. The cards are then fed into a digital computer. The computer interprets the data provided by the cards, calculates cutter center loci, interpolates curved sections to provide intermediate points defining a continuous cutter path, resolves specified feed rate into required speeds of the individual machine slides, translates decimal input information into binary coded form, arranges the results in the required format, and punches a control tape exactly as required, by the machine control unit which operates the milling machine.

When process planning each of the 51 pockets on the thrust bulkhead, automatic pocket milling routines are used. These routines permit the process planning of pockets with a minimum amount of information. The only information required to produce a specific pocket are: final dimensions of the pocket, number of rough cut passes required, depth of the finished cut, clearance plane and cutter diameter. When this information is fed to the computer, the computer automatically calculates the tool path for machining the complete pocket and punches this information on the control tape. . . .

Machining pocket area on one side of Atlas thrust bulkhead.



Delivering lost profits?



You can't afford to deliver your goods in obsolete equipment; that would be poor economy and tough on your name.

But what about obsolete production equipment? It may be out of sight, but it delivers a far greater loss in wasted time and manpower, excessive unit costs and reduced quality.

You might be surprised how easy it is to turn these losses into profits with a modern Gisholt Turret Lathe. These rugged lathes incorporate all the advantages you need to keep ahead of demands for higher, faster production and lower costs.

Ask your Gisholt Representative about Gisholt Ram and Saddle Type Turret Lathes — how they can be put to work in your plant earning extra profits, paying for themselves. Call him today or write for literature.

GISHOLT

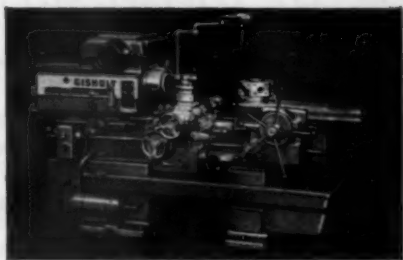
MACHINE COMPANY

Madison 10, Wisconsin

Investigate Gisholt's Extended
Payment and Leasing Plans

Turret Lathes • Automatic Lathes • Balancers • Superfinishers • Threading Lathes
• Factory-Rebuilt Machines with New Machine Guarantee

Use postpaid card. Circle No. 291



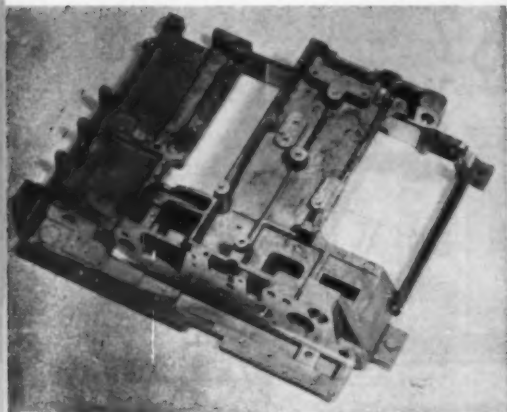
Gisholt Ram Type Turret Lathe



Gisholt Saddle Type Turret Lathe

News of Automation

continued



In this magnesium main frame, the line of eight Natcos drills 97 holes and performs 150 secondary operations: reaming, tapping, counterboring and countersinking.



By combining 3 new Natco machines with 5 retooled old ones—all identical models like these—Dictaphone ended up with a brand new production line for its new Time-Master frames.

Five Parts for the Cost of One

Bridgeport, Conn.—A switch from gang drill production to a line of eight multiple spindle drilling machines and three milling machines cut costs over 80 percent for Dictaphone Corp. on magnesium main frames for the new Time-Master.

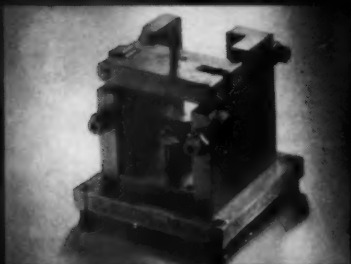
Castings, about 10 x 9 x 2 in. in size, come to the machining area cleaned and heat treated to relieve stresses. First station in the line is a Natco H-6 where 24-holes are drilled, 2 reamed, and four counterbored. Next the frames go to the profiler and two horizontal millers where faces are trued and brought to final dimensions. Then the frames start down the rest of the

line. No. 2 and 3 machines between them drill 46 holes, counterbore 3 and ream 5. No. 4 and 5 machines tap a total of 51 holes and countersink 48 of them. No. 6 and 7 machines drill 27 holes, tap and countersink 8, ream and counterbore one each. Holes range from $\frac{1}{8}$ in. to $\frac{1}{2}$ in. in diameter.

No. 8 machine is a retooled Natco 2-way. It is set up to ream or line ream 16 holes to very close tolerances, using only one way. The second way is available for another multiple spindle drilling head if a part change requires it.

• • •

Tooling with tape



This drill jig: \$280.00



This drill jig: \$4.20

you can see the profit in
point positioning with
DIGIMATIC* model 202

*DIGIMATIC IS OUR TRADEMARK

POINT-POSITIONING SYSTEM

Ask us to arrange a demonstration with your parts.
Write for free 12-page booklet, "DIGIMATIC Model 202 Point-Positioning System." Also—movies shown at your shop or plant on request.

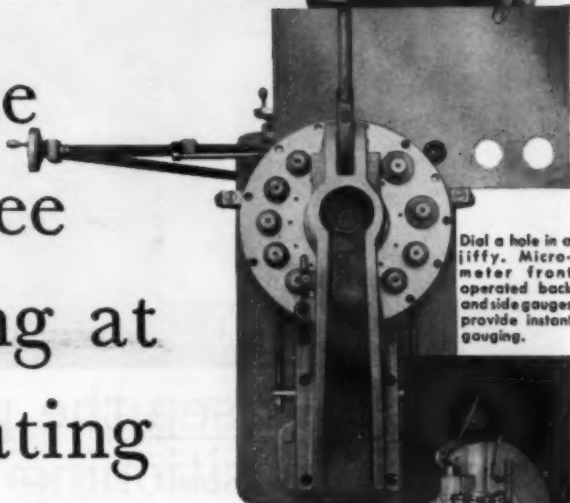
STROMBERG-CARLSON

A DIVISION OF **GENERAL DYNAMICS**

1492 N. GOODMAN STREET • ROCHESTER 3, NEW YORK

new Di-Acro^{} turret punch press*

Accurate Burr-Free Punching at 12 Rotating Stations



Dial a hole in a jiffy. Micro-meter front operated back and side gauges provide instant gauging.



The new Di-Acro 4 Ton Turret Punch Press provides rapid, close tolerance punching of round, square, oval and rectangular holes from 1/16" to 2".

Rotating turrets provide rapid indexing for single or sequence punching. Precision hole location quickly obtained with Micro-twin gauges. Punches sheet metals up to 16 gauge mild steel, fibre-

board, asbestos, paper, cork, leather, rubber, plastic and other sheet materials.

Dies are mounted in turrets—always handy. Standard clearance between punch and die is .002". Choice of 6 other clearances at no charge. The Di-Acro Turret Punch Press is safe, simple to operate—requires little maintenance.



Consult the Yellow Pages of your phone book under Machinery, Machine Tools for the name of your Di-Acro distributor or write us for Quick Facts Folder describing this and other Di-Acro machines.

O'NEIL-IRWIN MFG. CO.

^{*}pronounced die-ack-ro 314 8th Avenue • Lake City, Minn.

Use postpaid card. Circle No. 293

2 "Firsts" in Machine Tools Unveiled

CINCINNATI—That radial drilling machines have joined the ranks of elephant tools was demonstrated recently at the Cincinnati Bickford plant, a division of Giddings & Lewis Machine Tool Co.

Also on display was an electronically controlled work positioning table—said to be the largest and fastest of its type.

New 34-inch diameter column Cincinnati Bickford radials feature 10, 12, or 14-ft arms, full pendant control, rapid traverse to spindle, power-assist for swinging the arm, and complete preselection of 32 speeds and 18 feeds.

The first two of these machines have 10-ft arms, 9-ft clearance under the spindles, and weigh 80,000 lb each. They will be used for drilling and backfacing operations on turbine housings by the Large Steam Turbine-Generator Department of General Electric Company, Schenectady, New York.

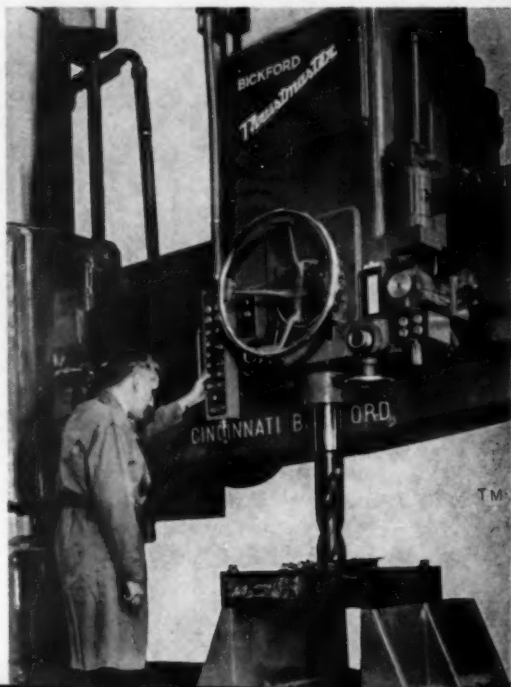
Pushbuttons in the pendant operate the power rapid traverse to the spindle and to the head, power engagement of the driving clutch, hydraulic

head and column clamps, control of the arm movement, and up or down movement; a safety master-stop switch extends from the bottom of the pendant station.

An all-new feature found in this radial is a power-assist to aid the operator in swinging the huge arm. Operation is controlled from a knurled knob located on the right side of the head.

The spindle construction is designed to take the brunt of extremely heavy thrust loads generated by the use of large drilling and backfacing tools.

Drilling a 5-inch diameter hole in solid steel with a Morse high-speed-steel twist drill on a Cincinnati Bickford radial with a 34-inch diameter column and 10-ft arm—largest radial ever built in the U.S. The machine has a 50-hp driving motor.



Field Reports

continued

Seven angular-contact antifriction bearings, preloaded to give maximum rigidity, support the spindle. Four bearings take direct vertical thrust while the other three carry backfacing loads.

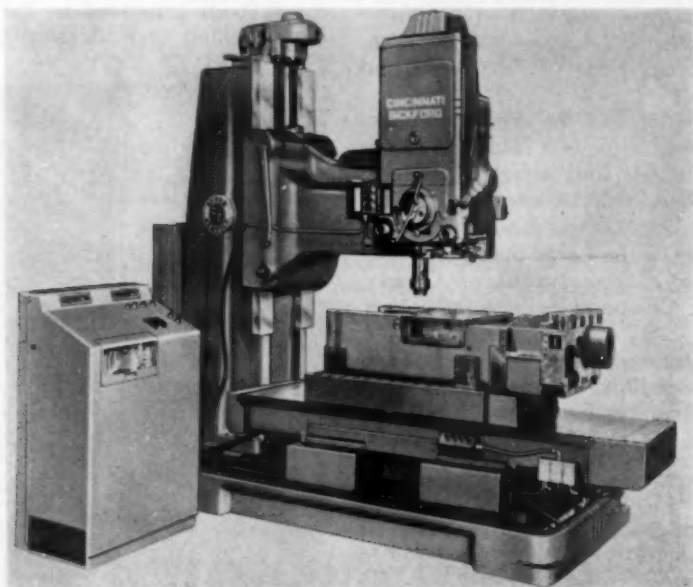
Power for heavy drilling loads at slow speeds is transmitted smoothly to the spindle through a large herringbone driving gear. When high spindle speeds are desired, the herringbone gear is declutched and the drive is then through a smaller spur gear, thus eliminating the usual flywheel effect.

Complete preselection of both speeds and feeds is featured while the spindle is running. Feeds are

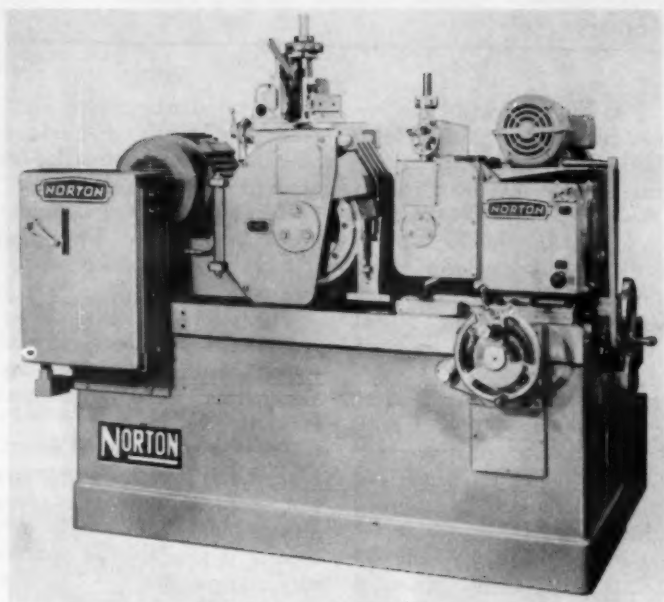
selected by a rotary valve manually positioned. Speeds are selected by an electrical selector switch which controls a series of solenoid valves.

The new, two-axis, tape-controlled positioning table displayed at the Cincinnati Bickford Division plant is said to be the largest and fastest on the market today. The control system was designed especially for this table by Concord Controls, Inc., of Boston and Cincinnati Bickford.

The table measures 38" x 50" and travels 32" x 44;" its load capacity is 10,000 lb; and its rapid traverse positioning speed is 360" per minute. The control is operated by standard punched paper tapes. • • •



New positioning table, developed by Cincinnati Bickford, is operated by numerical control developed specifically for the application.



The Norton No. 2 Centerless Grinding Machine

Norton Adds Centerless Grinder to Line

WORCESTER—The Norton Straddle Bearing Centerless Grinder was unveiled at the company's Worcester, Mass., plant recently.

As a leading supplier of grinding wheels for centerless machines and as a user of this type of grinder, Norton Company has certain ideas about features which such machines should have. When it was decided to build this machine, users of centerless machines were asked for their suggestions on what features they would like to see incorporated in a new design.

Straddle Bearings provide support on both sides of the wheel to prevent the deflection normally encountered

when an extra wide wheel is mounted on the end of a spindle which is unsupported. Size and straightness control is more consistent since the wheels do not move out of position during the grind. Thru-feed parts are more consistently sized even though the loading may be interrupted. Wheel truing is more accurate because there is no deflection under truing pressure.

The Norton Centerless Grinder employs a grinding wheel slide with rotating feed screw for precise wheel feed on plunge grinding operations, or fine adjustment for sizing on thru-feed grinding.

Wheel feeding or adjustment is

Field Reports

continued

made by a handwheel with a click-count wheel feed index graduated to fifty millionths of an inch, or by a long lever at the end of the machine. In addition, the regulating wheel head is adjustable longitudinally to accommodate various diameters of work pieces, as well as to compensate for the reduction on regulating wheel diameter caused by normal wear of truing.

Since the grinding wheel is fed to the work, the work feed line of both the machine and the work conveying equipment remains fixed. As the wheel wears, the wheel slide is moved closer to the work rest.

Grinding wheel truing is manually controlled but hydraulically powered

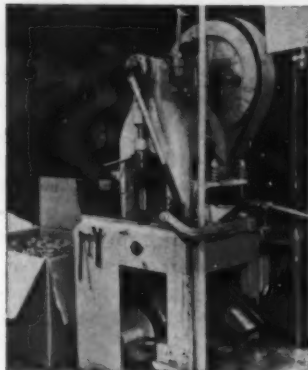
in the standard version. The operator feeds the truing diamond manually and then merely turns a lever which actuates the hydraulic truing stroke.

Regulating wheel grinding speeds are adjustable from 8 to 66 r.p.m. and quickly set by turning a conveniently located knob.

The work rest is mounted on the regulating wheel-head base and swivels with the regulating wheel eliminating extra adjustment when correcting for taper.

The Norton Centerless Grinding Machine is designed for manual control, but an automatic plunge feed arrangement with single cycle lever control is available as optional accessory equipment. • • •

1500% MORE PIECES PER DIE SHARPENING



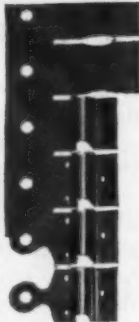
on this HAVIR Press

(formerly DIEBEL)

**with Exclusive
Cylindrical Ram**

OLD METHOD on O.B.I. presses required three 5 station dies that had to be sharpened every 50,000 pieces. Punch breakage was high. Two O.B.I. presses working two shifts produced 25,000 pieces per day.

NEW METHOD on a HAVIR 12 Ton Hi-Production Automatic produces as high as 800,000 pieces per grind with less punch breakage. These calendar pencil clips are made from .008" stock at the Brown & Bigelow plant in Minneapolis.



This 1500% increase in die life is dramatic proof that the HAVIR exclusive cylindrical ram cuts die deflection to a minimum.

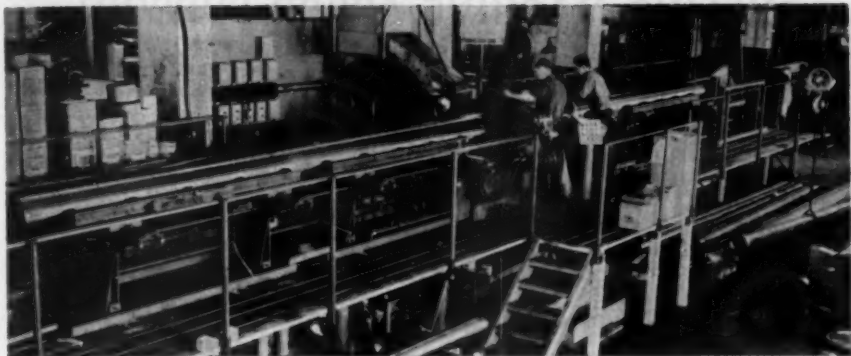
HAVIR (formerly DIEBEL) Hi-Speed Automatic Presses available from 5 to 150 Ton. Ask your HAVIR Dealer or write direct.

Sales Service Mfg. Co.

2361 UNIVERSITY AVE.

ST. PAUL 14B, MINN.

Use postpaid card. Circle No. 294



Work 56 ft. long is centerless ground in this set-up, using abrasive belts.

Centerless Belt Grinding Tubular Steel Plungers at Otis Elevator Plant

SAN FRANCISCO—Otis Elevator Co. is centerless grinding to a specified finish, and almost perfect concentricity, tubular steel elevator plungers up to 16 in. in diameter, some of them as much as 56 ft long. Work is fed to the coated abrasive belts at 65 ft per min, and on some diameters, stock removal reaches $\frac{1}{2}$ lb per min at an abrasives cost of less than \$0.10 per lb.

Mild steel pipe of 4- to 16-in. diameter is descaled, high spots are removed and the pipe ground in a Model 614 Production Machine Co. centerless grinder. The pipe, with wall thickness from $\frac{5}{16}$ to $\frac{3}{4}$ -in., is held to ± 0.002 in. roundness on smaller sizes through 6-in diameters, and to ± 0.003 in. on larger sizes. Surface finish required is 16 to 32 micro-inches.

Product engineers from Behr-Manning Co. helped to establish the grinding procedure, which is now standardized with 40-grit 6 x 168 in. aluminum oxide cloth belts with all-resin bonds, running at 3500 sfpm.

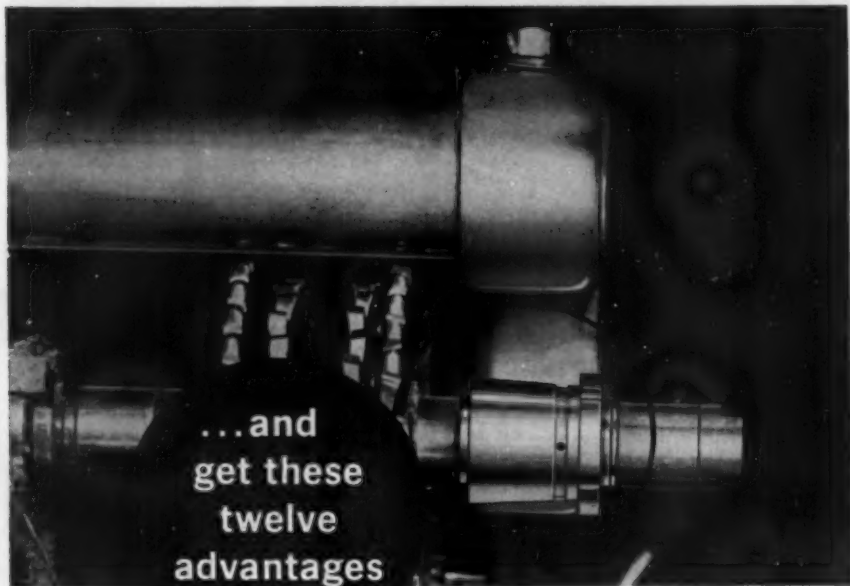


Belt grinding holds roundness to plus-minus .003 in. on large diameter work.

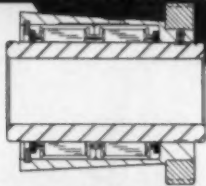
Photos courtesy Behr-Manning

Finish is attained by making several passes with a 100-grit aluminum oxide belt, then one or two clean-up passes with grit 180. The work is flooded with a sulphur-chlorinated oil. • • •

Replace the bronze bushing in your
MILLING MACHINE ARBOR SUPPORT
with a **Sonnet ROLLER BEARING**



...and
get these
twelve
advantages



- Faster speeds and feeds
- Maximum rigidity
- No chatter
- No bearing heating
- No bearing seizure
- No twisted arbors
- Longer cutter life
- Utilizes machine's lubrication system
- Increased production
- Better finishes
- Less maintenance
- Faster set-ups

Installed in minutes without machine rework. Requires no extra space; no adjustments. Extra sets of bushings provided to accommodate different size arbors. Permits full range of speeds and feeds of late model milling machines. Carbide cutters can be fully utilized.

Write for catalog.

SONNET

TOOL & MFG. CO.

580 North Prairie Avenue
Hawthorne, California

Use postpaid card. Circle No. 295

Self Feeding Die Holder for Short Run Threading Jobs

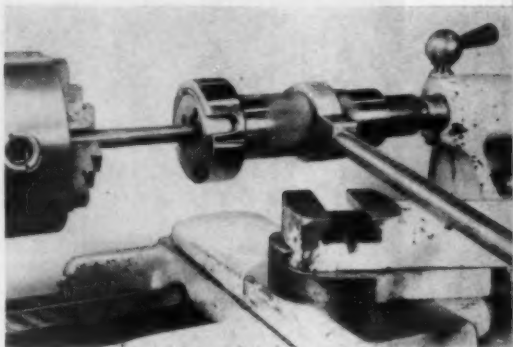
By H. J. Gerber

● The illustrated die holder was designed and built in our shop to facilitate the frequent short run die threading jobs we run in an engine lathe.

The device is designed to hold and guide standard low priced dies of the solid adjustable "button" type. It has a Morse No. 2 taper shank which can be held in the tail spindle of a small bench engine lathe, or may be sleeved out to fit the tail spindle of larger lathes.

The die holder is self-feeding on its own shank, and because all moving parts are precision ground and lapped to fit, very good alignment can be maintained on the thread being cut.

The tool (see illustration) is made



up of the following individual parts:

(A) Body with taper shank. Carburized, hardened, and ground all over. Is provided with a keyway along entire length.

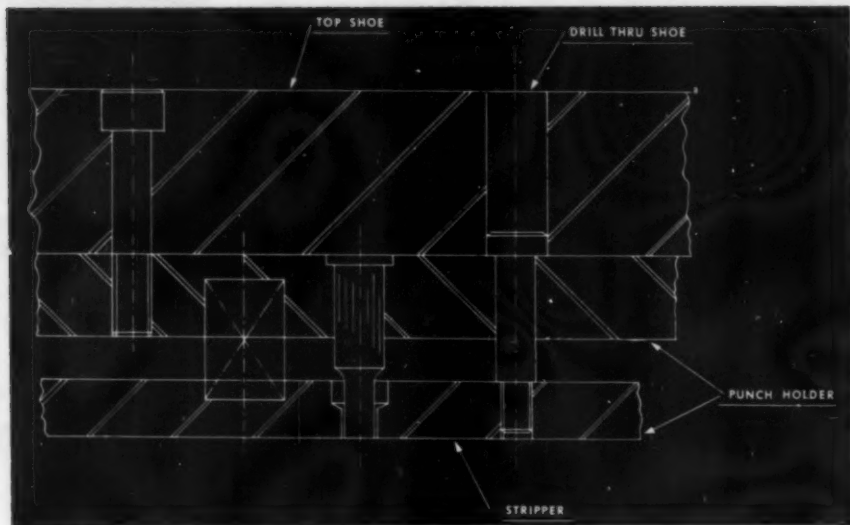
(B) Sleeve. Has internal key to fit keyway in (A). Enlarged end is bored to fit large size button dies. The I.D. is lapped to smooth sliding fit on (A).

(C) Adaptor or reducer permits smaller diameter dies to be held in (B).

(D) Collar and lever handle are used when threading large diameters in order to prevent torque slippage of the taper shank in the lathe tail spindle. This handle is made of brass bar stock and is rested on either the lathe bed ways or on the lathe compound when the tool is in use.

• • •





Reducing Die Maintenance Costs

By Roger Isetts

● On larger high production piercing dies where die maintenance is a big factor, a little forethought in the initial die design can go a long way toward reducing future die up-keep costs.

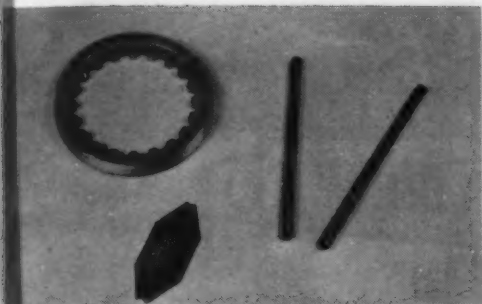
When sharpening or replacing broken punches it is necessary to remove the punch holder pad and the stripper. To facilitate this, instead of counterboring the top shoe for the stripper bolt heads, a simple yet often overlooked method is to drill the holes straight thru, so the stripper bolt heads rest directly on the top of the punch holder. This will allow the stripper, punch holder and punches

to be removed as one unit making it unnecessary to unscrew any of the stripper bolts. The punches can then be taken out thru the top of the punch holder leaving the rest of the assembly intact, thus preventing a great deal of unnecessary labor dismantling and reassembling a lot of loose parts. ● ● ●

Holding Measuring Wires Inside Internal Gear

By H. J. Gerber

● Using the two wire system for checking the thickness of teeth in internal gears can present a number of difficulties. To hold the wires or rolls



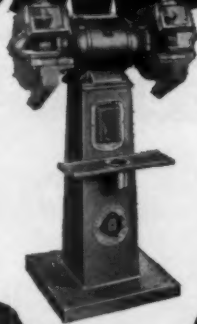
tightly in contact with the tooth spaces requires some sort of holding device which will be entirely independent of the operator's hands.

It takes but a few minutes to solve this problem on any gear such as the one pictured. I keep on hand a supply of blued temper sheet spring steel for the purpose of making flat bridging springs which are used to spread the rolls tightly between two opposite tooth spaces. This material is not difficult to cut with ordinary tin snips.

This spring bridge is cut slightly long so that it bears tightly against the rolls when sprung between them with a slight bow. A notch is provided in each end of the bridge to seat against the rolls. The gear and rolls may now be held with one hand while the other is used to make the micrometer measurement. • • •

August, 1959

30 DAY FREE TRIAL



- BENCH
- PEDESTAL

Queen City HEAVY DUTY

- GRINDERS • DISC GRINDERS and BUFFERS

We know what goes into these Grinders and Buffers! That's why we can make this offer.

Point for point — you just can't beat QUEEN CITY Heavy Duty Disc Grinders and Buffers. Built to stand up under hardest use . . . heavy duty motors deliver full horsepower. Wheels, guards, switches, cords, eyeshields are of highest quality . . . selected to deliver long, trouble-free service.

Choose from a complete line of floor or bench types . . . in sizes from $\frac{1}{2}$ to 10 H.P. and buy them for 20 to 30% under competing makes. Try them for 30 days on money-back guarantee!

QUEEN CITY
MACHINE TOOL CO

write for
FREE CATALOG
TODAY!

3912 KELLOGG AVE.
Cincinnati 26, Ohio

"Known for Quality for Over 50 Years"

Use postpaid card. Circle No. 296

sure / bore

"Package Plan"

offers...

★ CONVENIENCE

★ EFFICIENCY

★ ECONOMY



NEW PACKAGE PLAN INCLUDES:

Boring Bar "4-some Package"...

4 Boring Bars from 7/8" to 1-3/4" dia., with Micrometer adjustment. Tool Bit mounted at 53° or 90° angle. Boring range from 1" to 3-1/8" dia.

Sure-Bore Cartridge "Package"...

"53" or "90" pack includes 3 complete assemblies, cartridges, carbide tool bits, wrenches.

Boring Head "2-some Package"...

includes a 2" and 3" head, 2 long and 2 short tool bits... Boring range 2-3/4" to 5-1/4" dia.



WRITE FOR LITERATURE AND PRICES



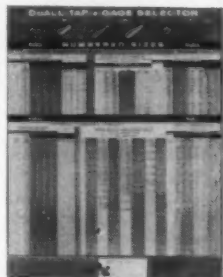
PORTAGE Double-Quick, Inc.

1037 SWEITZER AVENUE • AKRON 11, OHIO

Use postpaid card. Circle No. 297



(See Number 1)



(See Number 2)



(See Number 3)

To receive copies of booklets described below, circle their identifying numbers on an Action Card, found opposite pages 72 and 200.

1. Projection Gaging. Catalog/reference manual comprehensively treats the principles involved in optical gaging—principles which can be applied to almost endless gaging and inspection problems. Sections cover chart layout materials, Chart-Gages and fixtures, projector tracers, contour transcribers, standard accessories. Book is finger-tabbed for easy reference; lies flat in use. Optical Gaging Products Inc., Rochester 11, N.Y.

2. Tap and Gage Selector Chart contains at-a-glance information formerly obtainable only from two or three different references. The chart lists the DoAll tap, tap drill size and plug and ring gages needed to produce and check classes of thread. It shows all standard N.C. and N.F. sizes as well as many N.E.F. and N. sizes considered special. DoAll Co., Des Plaines, Ill.

3. "Better Tomorrows Begin Today at Allis-Chalmers" provides a quick look at the facilities and products made in each of the company's works. Booklet gives capsule facts about power generating and electrical transmission and distribution equipment, processing machinery, farm and industrial tractors, nuclear research and development. Allis-Chalmers Mfg. Co., Box 512, Milwaukee.

4. Aircraft Bolts for working temperatures to 1600° F.—highest-heat standard fasteners ever offered—are described in new literature. Previous high sustained temperature for standard aircraft bolts was 1200° F. Application will be primarily in holding jet engine and rocket motors together for higher temperature operation, and for structural use with hypersonic airframes and missiles. Standard Pressed Steel Co., Jenkintown, Pa.

5. Steel Couplings. Catalog FT-55 presents JIC flared tube and Dryseal pipe fittings. Induction toughened tube outlets prevent collapse of flare seat and stripping of threads. Other features: burnished seats for leakproof joints; sufficient stock to tap for gage line connections; radius corners for free flow passages; large flat wrench areas for easier installation. L and L Mfg. Co., 8088 E. Nine Mile Rd., Van Dyke, Mich.

Free Literature

continued

6. Flame Hardening. Catalog contains engineering chart with ranges for hardness and depth usually required in flame hardening. Illustrations demonstrate sizes and kinds of machine ways, rolls, gears, sprockets, rings, cams, dies and wheels that are regularly flame hardened. Chicago Flame Hardening Co., 420 E. 151st St., East Chicago, Ind.

7. Cut-off Machine. Folder from James Smith & Son, Inc., 982 Southbridge St., Worcester 10, Mass., announces that they are manufacturing and marketing the Bullard cut-off machine, developed and formerly sold by the George H. Bullard Co. The wheel feeds vertically within the rugged frame, affording maximum protection to operator and others nearby.

8. Air Conditioners. Catalog No. 570 presents line of Model PAC packaged air conditioners—ranging from 20 to 60 tons. All controls and maintenance points are on one side of the unit so that it may be installed close to a wall. Acme Industries, Inc., Jackson, Mich.

9. Hydraulic Cylinders. Catalog No. 958 and Parts List present the HyPower hydraulic cylinder. New stroke controls feature ease of attachment and removal, positive alignment, positive control, no moving parts, versatility, economy. Tur-

lock Iron & Machine Works, P.O. Box 609, Turlock, Calif.

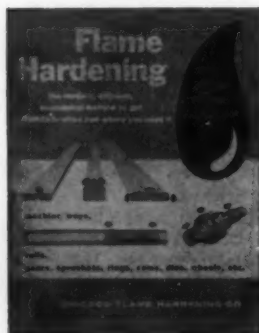
10. Stainless Wire. A comprehensive, 77-page book on cold drawn stainless steel wire describes the general qualities of 27 different types of ferritic, austenitic, ferritic-austenitic, and martensitic stainless steels. Uddeholm Co. of America, 155 E. 44th St., New York 17, N.Y.

11. Light-Heavyweight Machine Tools and accessories are described in revised 48-page catalog. Drill presses, grinders, cut-off machines, band saws and belt and disc surfacers are presented. Rockwell Mfg. Co., Walker-Turner Power Tool Div., Dept. 1009, Lexington Ave., Pittsburgh.

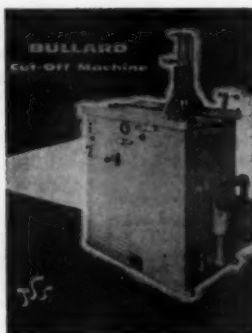
12. Indexing Table. Features that make the Ultradex indexing table outstanding for accuracy as well as speed are listed in Bulletin X59. The table provides angular indexing to any degree setting within $\frac{1}{4}$ second of arc. About three seconds' time is required to index. A special adaptor plate for indexing in increments smaller than a full degree is described. Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.

13. Gun Drill Manual contains helpful information on all phases of gun drilling. It explains how gun drills can be used on critical drilling jobs involving fine finish, accurate size, pinpoint location, and holes of all depths. The Cleveland Twist Drill Co., Cleveland 14, Ohio.

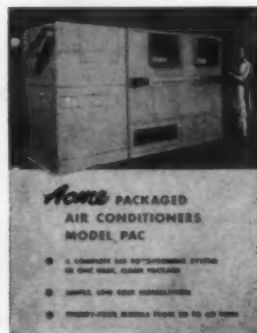
14. Live Centers. Booklet contains illustrations, diagrams and specifications of



(See Number 6)



(See Number 7)



(See Number 8)

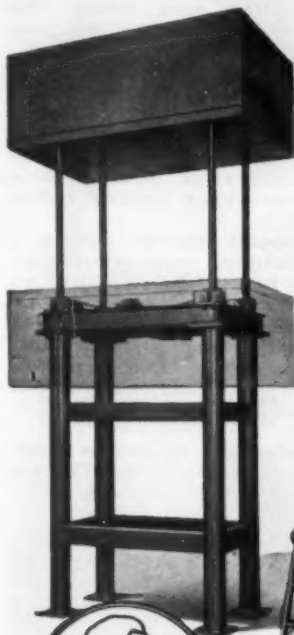
**HIGH LIFT...
HEAVY LIFT...
OR BOTH!**

2741



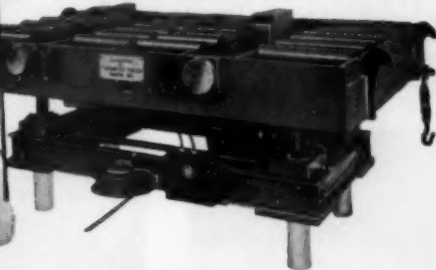
PORTELVATOR®

ENGINEERED POSITIONING EQUIPMENT



- ★ **PORTABLE or STATIONARY**
- ★ **manual or power operation**
- ★ **ANY KIND or DEGREE of MOVEMENT**
- ★ **manual or completely automatic controls**

★ Portelvator's mechanical power transmission design locks the top-plate by gravity in any attained position. Application of this transmission to multiple elevating screws provides unequalled safety.



**IT'S A
HAMILTON TOOL
USE IT
WITH CONFIDENCE**

**Write for
FREE LITERATURE BATCH No. P-801**

**THE HAMILTON TOOL COMPANY
826 SOUTH NINTH STREET • HAMILTON • OHIO**

Free Literature

continued

precision-built live centers with accuracy better than .0001". J & S Tool Co., Livingston, N.J.

15. Spring Alloy. Handbook gives technical facts on Elgiloy, an alloy with high resistance to corrosion, set and fatigue, and a non-magnetic quality which suits it for instrument applications. Elgin National Watch Co., Elgin, Ill., is supplying industry with a wide variety of special Elgiloy parts, including springs, drive bands, torsion bars, ball bearings, stamped and machined parts.

16. Power Tools. The Delta "Blue Book" contains 65 illustrated case histories that tell how Delta tools are used in combination with other tools, with automatic controls, and in special setups to combine operations, automate operation, increase production, improve quality. Delta Power Tool Div., Rockwell Mfg. Co., 4 N. Lexington Ave., Pittsburgh 8, Pa.

17. Turret Drill. Bulletin covers the improved Burgmaster 1C six-spindle hand feed turret drill, which features power indexing turret with 12 preselective spindle speeds, from 325 to 4050 rpm, preselective, precision depth control, and optional tooling accessories and equipment. Burg Tool Mfg. Co., 15001 S. Figueroa St., Gardena, Calif.

18. Semi-Automatic Lubricators that can service as many as 100 bearings on a machine are described in Bulletin 30. The "One-Shot" units are used on machines requiring closely controlled but infrequent oiling. Bijur Lubricating Corp., 151 W. Passaic St., Rochelle Park, N.J.

19. "Aircomatic and Heliwelding of Aluminum," a comprehensive survey of the techniques of welding aluminum using these two processes, thoroughly covers the entire subject, from a brief historical note on the first uses of these processes to the highly specialized aluminum fabrications which are being welded with them today. Air Reduction Co., Inc., New York 17, N.Y.

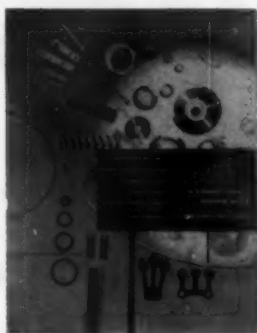
20. Portable Band Saw can be set in horizontal, vertical or angle positions in seconds without the use of tools. For welding, sheet metal, electrical, plumbing, maintenance shops. Flyer available from Arrow Saw Corp., Madison 1, Wis.

21. Arbor Support Bearings utilizing a new load-equalization design principle are described in Bulletin AB-57-1. Data includes specifications and construction details of bearings for use in standard milling machines. Free-running pilot bearings for supporting rotary shank-type tools are also described. Briney Mfg. Co., P.O. Box 208, Pontiac, Mich.

22. "Engineering and Application Data" pertains to overhead materials handling equipment and covers various types of



(See Number 14)



(See Number 15)



(See Number 16)

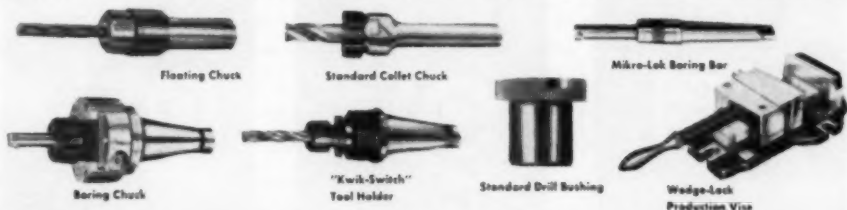
UNIVERSAL JIG AND FIXTURE COMPONENTS AND CLAMP ASSEMBLIES

Shown here are a few of more than a thousand different items in regular steel and stainless steel—the largest and most complete selection in the United States—now available from Universal Engineering Co. Write today for your copy of the complete, new catalog.



213

OTHER PRECISION-BUILT COST SAVING UNIVERSAL PRODUCTION TOOLS



Floating Chuck

Standard Collet Chuck

Mikro-Lok Boring Bar

Boring Chuck

"Kwik-Switch"
Tool Holder

Standard Drill Bushing

Wedge-Lock
Production Vise

UNIVERSAL ENGINEERING COMPANY, FRANKENMUTH 10, MICHIGAN

Free Literature

continued

carriers, cranes, tractors, track switches, grabs, electrification. Detailed studies of track design, peening and stresses are included. Cleveland Tramrail Div., The Cleveland Crane & Eng. Co., Wickliffe, O.

22. Single Spindle Bar Automatics. New bulletin gives detailed description and specifications of 1½" and 2½" cap. Model B and Model B-15" automatics. These are not turret-type machines. Tooling is mounted on a flat end-working slide, capable of turning several OD's in addition to performing one end-working operation. The Cleveland Automatic Machine Co., Cincinnati 12, Ohio.

24. Easy-to-Use Tap Reference is carefully planned to simplify the selection of taps. The book contains a wide variety of information helpful to tap users. Tap-size selection data, complete information on class of fit, limit numbers, gage data, and availability from stock are combined into one well-organized table. Besly-Welles Corp., South Beloit, Ill.

25. "The Automatic Production of Forgings in Closed Dies" details various applications of the Impacter tool. The booklet also outlines the various considerations that must be dealt with in the mechanizations of the forging process. Chambersburg Engineering Co., Chambersburg, Pa.

26. Multi-Mister Equipment for cooling and lubricating forming and cutting tools for metals and plastics is presented in folder. Consists of one or more spray nozzles and brackets for mounting close to the tool. DeVilbiss Co., Toledo 1, O.

27. Shearing, Peening, bevel edge nibbling, tube notching, beading, folding, louver forming, circle nibbling, flanging can be performed on Pioneer machine illustrated in folder from Dion Machinery Inc., 1116 Great Plain Ave., Needham 92, Mass.

28. New Metal Forming Process, Flo-Reforming, which produces tall shell-type cylindrical parts, is described in folder. Included are cost comparisons with deep drawing, engineering data and equipment details. Floturn Div., The Lodge & Shipley Co., 3055 Colerain Ave., Cincinnati 25, Ohio.

29. The Contract Division of Kearney & Trecker... how it can serve you, is the subject of 8-page booklet. For parts, components, or complete assemblies—small lots or big volume. Kearney & Trecker Corp., 6800 W. National Ave., Milwaukee

30. Magnetic Base Test Indicator offers positive grip holding—won't dislodge from machine vibrations. Its 50-100 lb. magnetic pull is easily released by tipping side-ways. All components above base are made of nonmagnetic stainless steel so as not to affect sensitivity and accuracy of indicator. Koch Test Indicator, 28 Second Ave., Nyack, N.Y.



(See Number 22)



(See Number 23)



(See Number 24)

SYNTRON Vertical Vibratory **PARTS FEEDERS**



increase the efficiency and economy of parts handling

Applications for SYNTRON Parts Feeders in the metal working industry are unlimited.

Whether it's orienting and feeding parts to machining, assembling, packaging, or other automatic operations, SYNTRON has a parts feeder to do the job—more efficient, more dependable and more economical than by slow manual methods.

Custom built, SYNTRON Parts Feeder bowls can be fabricated to orient parts of almost every size, shape, and material. This—plus instantly controllable, high-frequency vibration (3600 vibrations per minute)—assures the maximum flow of parts to meet the requirements of continuous, automatic production lines.

SYNTRON Parts Feeders with electromagnetic drive provide a positive, dependable vibration to move most parts efficiently and at high rates, yet gentle enough to handle delicate, precision parts without damage.

SYNTRON Parts Feeders can increase the efficiency and economy of parts handling.

Write for detailed information

SYNTRON COMPANY

300 Lexington Avenue

Homer City, Penna.

Free Literature

continued

31. Balancer. Model 2260 precision portable balancer for Cincinnati No. 2 centerless grinders provides a fast and dependable way to balance grinding wheels without removing them from the machine. Folder available from Aero Supply Mfg. Co., Inc., Corry, Pa.

32. Universal-Cyclops Steel Corp., Bridgeville, Pa., has announced a full-color brochure on its new plant at Coshocton, Ohio, for cold finishing of stainless steel strip. These facilities supplement their Bridgeville plant and add 20,000 tons of stainless strip annually to the company's capacity.

33. "Slitting Lines for Coils and Sheets" has been revised by the Yoder Co., Cleveland 2, Ohio. Book contains basic information on design, selection and operation of slitters and slitting lines. It includes time studies and analyses of operating cycles, along with specifications, capacity tables and other data on uncoilers, recoilers, coil cars, scrap choppers.

34. Hydraulic Tracer Controls, duplicators for any type of machine, are catalogued in folder from Micro-Hydro Duplicator Div., James Engineering & Machinery Co., Dearborn, Mich. Units are offered in three methods: 1) customer makes own brackets and installation; 2)

Jemco supervises installation; 3) Jemco makes complete installation.

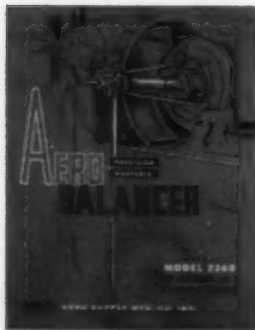
35. Films. A catalog of business and professional free loan 16mm sound motion pictures is offered by Modern Talking Picture Service, Inc., 3 E. 54th St., New York 22. The films show new industrial products, devices, tools, methods, new applications or scientific findings.

36. Pencil Grinder. Bulletin 61 gives the features and specifications of the new air powered Rotor M1223, D-03 pencil grinder. This tool is used with small carbide cutters, burrs, mounted points and drills. Rotor Tool Co., Cleveland.

37. Redesigned Press Brake. Bulletin 90A contains information on Niagara's redesigned and expanded line of Series IB press brakes. Fully described are 15, 30 and 60 ton machines. Enclosed "inboard" design has wrap-around crown. Niagara Machine & Tool Works, 683 Northland Ave., Buffalo 11, N.Y.

38. Tracing Template Set, designed for companies who manufacture jigs, fixtures, and special machinery, includes over 200 components used by the industry most often. Northwestern Tools, Inc., 118 Hollier Ave., Dayton 3, Ohio.

39. "Automatic Screw Machining of Aluminum" contains data on all phases of the metal's use in this demanding operation. The new handbook supplements information on machining of aluminum in other types of equipment, given in a previous booklet, "Machining Aluminum." Reynolds Metals Co., Dept. PRD-10, Box 2346, Richmond 18, Va.



(See Number 31)



(See Number 32)



(See Number 33)

NOBLEWEST *precision* MARKING DIES

FOR EVERY METAL MARKING NEED



Flat Die for marking round pieces



Roll Die for marking flat pieces



Embossing Dies

There's a Noblewest steel marking die for rolling or stamping sharp, clear, permanent impressions into every type of metal surface—round, flat, concave, convex and irregular contours. Long the standard for quality, Noblewest dies are made of especially selected steel, precision engraved to extremely close tolerances and heat treated for extra long wear. Each is rigidly inspected and Rockwell tested for hardness. For extraordinary quality dies at ordinary prices, specify NOBLEWEST.

Send detail specifications to The Noble & Westbrook Manufacturing Company,
9 Westbrook Street, East Hartford 8, Connecticut.

MARK IT BEST WITH



NOBLEWEST

MARKING

NUMBERING

EMBOSSING

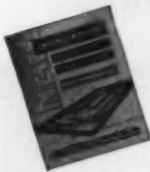
GRADUATING

NEW *from* GRAND RAPIDS

and just look at all these features:

- Powered vertical movement of wheel head*
- Instantly variable hydraulic table speed
- Greased-for-life precision ball bearing spindle with two speeds for long wheel life
- Head carried on protected pre-loaded ball bearing ways
- Equipped with Vickers vane type pump and our own control valve for infinite longitudinal table speeds from 5" to 120' per minute
- Variable speeds hydraulic cross feed and continuous cross feed
- Rugged, one-piece casting column and base for permanent rigid alignment
- Ultimate in accuracy with micro inch finish at production speeds

*Automatic downfeed available as optional feature



For full details, just send a note on your letterhead.

GALLMEYER & LIVINGSTON CO.
405 Straight Ave., S.W., Grand Rapids, Mich.

NO. 350 PRECISION TOOL ROOM TYPE HYDRAULIC FEED SURFACE GRINDER



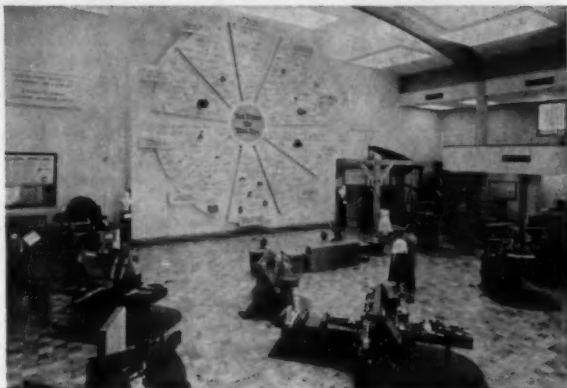
**GALLMEYER
& LIVINGSTON**

Use postpaid card. Circle No. 302

DoAll Presents a Pageant of Past and Present

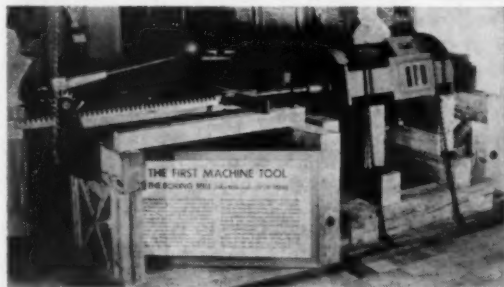
A spacious new Hall of Progress, housing a permanent historical presentation that traces the events of the Industrial Revolution, has been opened in Des Plaines, Ill., by the Do-All Co. The exhibit depicts the developments which in only two lifetimes enabled man to scale the ladder of material welfare farther and faster than in all the years in which he was preparing for this great burst of progress.

The historical presentation occupies one side of the hall. The other side is a demonstration-test center. Here the most modern machine tools are used to conduct machinability tests on all types of materials to solve production and cost problems for industry.

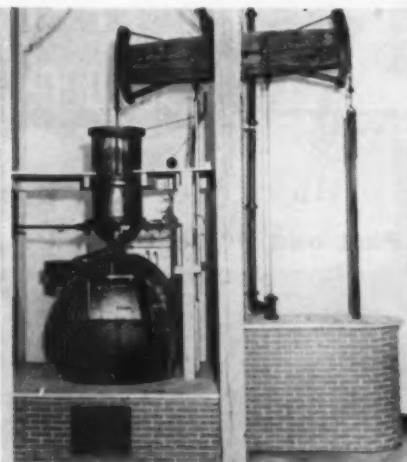


An imposing exhibit, "The Dawn of This Age," 30 ft in diameter, dominates one wall of the DoAll Hall of Progress. Recorded on the display by descriptions, illustrations and actual models are 157 of the most important inventions, discoveries and new concepts of the Industrial Revolution. Visitors can hear the story on a tape recording.

Central feature of the historical exhibits is a dramatic, three-story-high display, "The Dawn of This Age." Designed as a symbolic sunburst, it de-



This boring mill, the world's only full-size replica of the first machine tool, is shown in "The Dawn of This Age" exhibit. The original was invented in 1775 by John Wilkinson, an English foundryman, to bore cylinders accurate enough to hold steam pressure. This operation climaxed a 10-year struggle by James Watt to build the steam engine.



Quarter-scale replica of a 40-ft-high model of a Newcomen "atmospheric" engine, cut away to show how it operates, is being exhibited in DoAll's Hall of Progress. Pressure of the atmosphere, exerted through the open-top cylinder, drove the piston down into a partial vacuum that had been created by an injection of steam followed by a jet of cold water. These engines were used to pump water out of coal mines. About 100 of them were made between 1712 and 1776, when the more practical Watt steam engine made them obsolete.

picts 157 important discoveries of the Industrial Revolution that are responsible for our present age of abundance. For clarity and simplicity, these events are divided into ten realms of progress.

Twenty-four of the 108 illustrations on this display are full-size or scale models of great inventions. They include a Collins axe, which helped push the American frontier westward, Eli Whitney's cotton gin, Alexander Graham Bell's first telephone, and numerous precision measuring instruments.

Next to "The Dawn of This Age" stands an original James Watt steam engine, the only one in America. This engine, man's first power plant, was built in 1799 and furnished the power

that turned machinery in two English textile mills for nearly 150 years. It was in good operating condition when acquired by the DoAll Co. for the Hall of Progress. The 60 hp engine was completely dismantled, brought to the United States, and reassembled in the hall. Visitors will see it in operation, though it now is powered by a concealed electric motor instead of coal, the power source in its working days.

Next to the Watt engine is a Newcomen "atmospheric" engine. It is so called because atmospheric pressure supplied the power. This engine was the predecessor to and inspiration for the Watt engine. Watt was an instrument maker at the University of Glasgow in 1763 when he was asked to repair a model of the Newcomen engine the university maintained for student instruction. He quickly perceived the weaknesses of the Newcomen engine and realized that with certain basic improvements it could be developed into a truly efficient power plant. He spent the rest of his life inventing and then making improvements in his great "mechanical slave."

Until Watt made the Newcomen engine obsolete, it was used, for 60 years, in England and Europe to pump water out of coal mines. Up to the 18th century, wood was a universal fuel, but increasing demands were rapidly gobbling up the forests. Yet coal mining could not be accelerated until a way was found to eliminate the water that seeped into the mines as they went deeper. Thomas Newcomen, a dealer in mining tools, was one of several who tackled the problem. The engine he developed was the most practical solution till Watt came along.

Despite his genius, Watt never could have made a successful steam engine were it not for another historic machine on display in the hall. This is the boring mill, man's first machine tool. It was invented by John Wilkin-

AMERICAN ROLLER DIE CORP.
ARDCOR

HIGH PRODUCTION ROLL FORMING MACHINE FOR ALUMINUM SHAPES



This Model SF Lock Seam Tube Mill is forming $\frac{3}{8}$ " O.D., .016 wall lock-seam aluminum tube at 120 f.p.m. Cutoff is ARDCOR Model 10 Press with $1\frac{1}{2}$ " stroke, 60 strokes per min.

The new small Model SF ARDCOR Machine features: High production speeds; spindles 1.5"; new style rugged base with tool compartment and slanted front recessed for better operator stance; special narrow side roll stands with close 10" horizontal centers; fixed spur gears; quiet running all V-belt drive; low voltage protection. Basic machine readily converted to a Cold Roll Forming Machine.

ARDCOR Roll Forming Machines and Lock Seam Tube Mills are available in seven standard sizes, other sizes to customer specifications.

If your products can be cold roll formed. ARDCOR engineers can supply advancements in design and machine construction to produce them better . . . at greater speeds and profit.

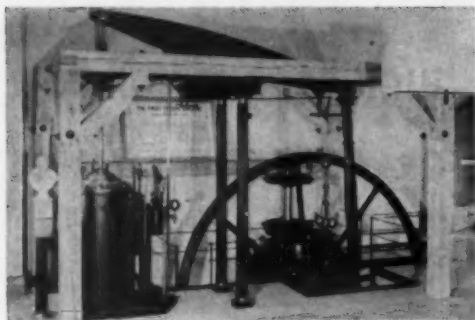
Consult our Engineering Facilities, without obligation . . .



American ROLLER DIE CORP.
29560 Clayton Avenue Wickliffe, Ohio

DESIGNERS, ENGINEERS AND BUILDERS. Single Roll Forming Machines or Completely Automated Production Lines for Cold Forming Ferrous and Non-Ferrous Electric Weld and Lock Seam Tube Mills • Forming Rolls, Tubing and Pipe Rolls • Straightening, Pinch and Leveller Rolls • Cut-Off Machines • Slitters

Use postpaid card. Circle No. 303



This steam engine, built by James Watt in 1799, was used to power English textile mills until 1945. It is one of many historical machines, inventions and discoveries of the Industrial Revolution that have been assembled as an educational exhibit to promote better public understanding of the forces which created our present way of life.

son of Bersham, England, in 1775 for the express purpose of producing cylinders for the Watt engine that would be accurate enough to hold steam pressure. The machine on display is the only full-size replica in the world. It was made from Wilkinson's original drawings.

By 1765 Watt had perfected his ideas for the first steam engine. He built successful working models, but for ten

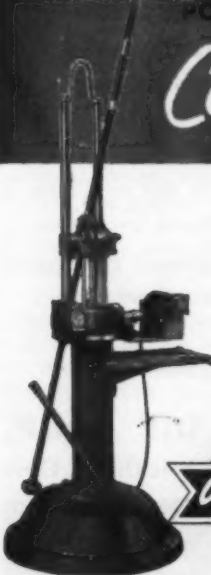
frustrating years he failed to construct a practical full-size model. The reason was that the best cylinder made by reamers of that day was $\frac{3}{8}$ " out of round and steam escaped around the piston even though it was wrapped in cork, oiled rags or old hats.

Then Wilkinson, a foundryman and ironmaster who foresaw the possibilities of steam power in his business, licked the problem. He mounted his

POWER SCRAPER


Cuts Production Costs...

... 5 HOUR JOB CUT TO 50 MINUTES



One manufacturer was scraping flat pieces measuring 18 by 24 inches... each piece requiring 5 hours to scrape by hand. An Anderson Power Scraper cut scraping time to 50 minutes! That meant a substantial saving in production costs and another happy Anderson customer. Let us help you estimate how much this portable, easy-to-use power scraper will save for you.

Today, Write for Bulletin 8-5



ANDERSON BROS. MFG. CO., Rockford, Ill.

Use postpaid card. Circle No. 304

water-powered boring bar on rigid supports at both ends and fed it through the cylinder by a mechanical rack and pinion attachment so it could not waver or be deflected by the rough casting during the boring operation. Until then the boring bar had been hand held and fed, resulting in rough, inaccurate cylinders.

Another historical exhibit is a full-size replica of the famous screw-cutting lathe invented by Henry Maudslay about 1800. With this lathe it became

possible for the first time to cut screws of variable pitches from one master lead screw by changing gears. This was the second basic machine tool invented. Some authorities consider it one of the greatest inventions of all time, because it contained elements still in use in most machine tools today.

The Hall of Progress, dedicated June 11, is open to the public and is available for meetings of technical and educational groups.



Quality

That's the word for Clearing Torc-Pac. It is thoughtfully designed, carefully built to take advantage of every economy. Result? A fine machine that tops anything in its field—by far. Price? Very reasonable. But find out for yourself...

Write for Torc-Pac Bulletin.

USI [®] **Clearing** [®]

DIV. OF U.S. INDUSTRIES, INC.

Machine Shows Planned for Sept. 1960 at Chicago

The Machine Tool Exposition, sponsored by the National Machine Tool Builders Association, is scheduled to be held at the International Amphitheatre, Chicago, Sept. 6-16, 1960. Concurrently, the Production Engineering Show will hold forth at Navy Pier in that city.

More than 125,000 production executives from every country of the world

are expected. A single registration will admit visitors to both events. The last time both shows were held, in 1955, attendance exceeded 103,000.

Exhibits at the Machine Tool Exposition are limited to company members of the Association which are producers of prime machine tools. The Production Engineering Show will exhibit products which support prime production tools—control equipment; machine components; inspection, gaging,

FAST, VERSATILE 2-in-1 BENDER

For Experimental,
Small Lot, or
Production Jobs

For fast, accurate bending of conduit, pipe, tubing, bars, rolled or extruded shapes, there's no substitute for the Pines 2-in-1 Hydraulic Bender. It's economically priced, simple and easy to tool and operate. Has double tool holder ways and an invertible head that permits either clockwise or counter-clockwise bending, helps eliminate workpiece interference. A new inexpensive plane-of-bend indicator with a 3-jaw chuck and calibrated degree dial reduces setup time. These, and other exclusive features, make this Pines Model 1400-A a fast, versatile machine in your tool room, experimental or production department. Maximum capacity is 1 1/4" O.D. tubing. Production speed is 300 to 400 bends per hour.

PINES ENGINEERING CO., INC.

Specialties in Tube Fabricating Machinery 600 WALNUT • AURORA, ILLINOIS

PRODUCTION BENDING • DEBURRING • CHAMFERING MACHINES

WRITE FOR COMPLETE DATA

Get complete facts today on the Pines Model 1400-A 2-in-1 Bender and the new plane-of-bend indicator.



Pines Model 1400-A with new inexpensive plane-of-bend indicator. Sliding 3-jaw chuck grips end of work. Graduated dial shows plane of bend in degrees.

Use postpaid card. Circle No. 306

and testing equipment; materials handling equipment, etc.

Bus service will take visitors from one show to the other, and hours of operation will be dovetailed to permit visitors to utilize their time to best advantage.

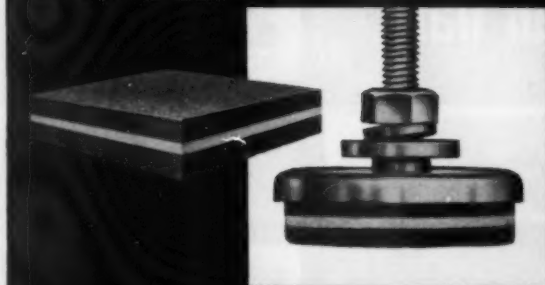
ASME Nominees Chosen

Walker Lee Cisler, president of the Detroit Edison Co., was recently nominated to lead the American Society

of Mechanical Engineers. Cisler heads a slate of four vice-presidents and three directors. The new officers will be installed in December, during the Society's annual meeting, in Atlantic City, following a mail ballot of the members.

The other nominees are: Vice-presidents—Charles H. Coogan, professor and head of the mechanical engineering department, University of Connecticut; William C. Heath, director of mar-

How to Control VIBRATION



Unisorb pads and Leveling Mounts reduce up to 85% of transmitted vibration and noise! Effective on everything from light laboratory equipment to giant machines.

- Complete selection of types for precision mounting, various loadings and machine lengths.
- Works two ways: Prevents external vibration from affecting equipment; Reduces machinery-generated vibration from being transmitted to floor.
- Allows higher driving frequencies, faster machine operation.
- High friction coefficient prevents "walking," cement available for extreme reciprocal thrusts.

Unisorb can be used by itself or incorporated into special-purpose mounts or machine designs. Send for new Unisorb Bulletin and details on Money-Back Trial Offer, NOW.

UNISORB

Division of The FELTERS Company

Use postpaid card. Circle No. 307

203 South St.,
Boston 11,
Massachusetts
FE9-14

ket development, Solar Aircraft Co., La Mesa, Calif.; Donald E. Marlowe, dean of the school of engineering and architecture, Catholic University of America, Washington, D. C., and Henry N. Muller, Jr., vice-president of Canadian Westinghouse Co., Ltd., Hamilton, Ontario. Directors—Everett M. Barber, research supervisor, Texaco Research Center, Beacon, N. Y.; Clarence C. Franck, consulting engineer, steam division, Westinghouse Electric

Corp., Philadelphia, and William H. Larkin, New England manager for the Air Preheater Corp., New York.

Robt. E. Morris Co. Exhibits Machine Tools

A three-day machine tool show was staged recently at the Robert E. Morris Co., West Hartford, Conn.

Visitors evinced a particular interest in the new Clearing-Axelson steel bed lathe, being demonstrated for the

the names that stand for **production**
in the metal-working centers of America

air hard	
	ohio die
crocar	

These are the most profitable cold work die steels at the disposal of the diemaker today, in down-to-earth *performance per dollar per pound*. Each is an air-hardening grade, each has its unbeatable area of application. Only three names to remember—AIR HARD, OHIO DIE, CROCAR—and you've got it made! Check us for the technical data you can use.



Vanadium-Alloys Steel Company

LATROBE, PENNSYLVANIA

Use postpaid card. Circle No. 308

MACHINE and TOOL BLUE BOOK

first time anywhere outside of the manufacturer's plant. Its unusual welded steel construction and the flexibility afforded by the modular head stock was the cause of much comment among the viewers.

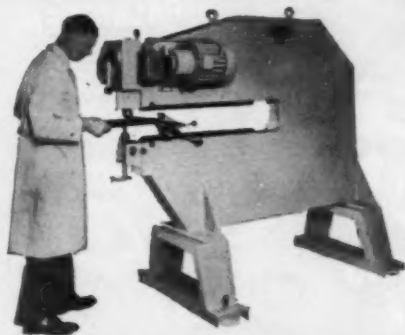
Exhibits included demonstrations in turning, milling, grinding, cold-heading, hydraulic copying, drilling, and tapping. Many of those in attendance indicated they were contemplating the purchase of new machinery in the

near future—which may be a good sign that the industrial climate of the area has almost completely recovered from the lows of a year ago.

Ace Drill Bushing Co. Breaks Ground

Construction is under way for the new 25,000 sq ft Ace Drill Bushing Co. plant at Arlington, Calif. The project was made possible through negotiation

NOW! BUY ONE PULLMAX MACHINE



Now you can do all this work on one machine—save time, labor and material as well as expensive die costs. Cuts mild steel up to 13/32". 8 sizes of machines to choose from.

Write for demonstration.

We'll send a Pullmax demonstrator to your plant. Just tell us when.

16mm Sound Movie Available



Write for Free catalog on Metalworking Ideas

AMERICAN PULLMAX CO., INC.

2473 N. Sheffield Ave., Chicago 14, Illinois



Dishing



Beading



Louver Cutting



Irregular or Freehand



Edge Bending



Nibbling



Flanging



Slot Cutting



Joggling or Offsetting



Inside Square Cutting



Straight Cutting



Circle Cutting

with La Sierra College for erection of the plant on ten acres of college land. Ambitious students will be assisted in paying for their college education by working and training for industry at Ace.

The long range objective of the company is to establish similar facilities in connection with other colleges and operate them in such a manner as to improve educational opportunities in small communities.

Producto Machine and Ring Punch & Die Merge

Ring Punch & Die, Inc., Jamestown, N. Y., recently became a division of the Producto Machine Co., Bridgeport, Conn.

The new division will continue in Jamestown. With the merger, C. Ernest Larson and Emil M. Johnson, former officers of Ring Punch & Die, have become vice-presidents of Producto.

Producto, a manufacturer of die sets,

WRITE NOW FOR
THIS

**FREE
CATALOG**

ON
WORK HOLDING
TOOLS FOR
PRODUCTION, TOOLING, MAINTENANCE



Drill press vises, angle vises, swivel machine vises, rotary tables, lathe milling attachments, production vises, heavy duty angle vises, and adjustable angle plates are illustrated and fully described in the New Palmgren Catalog. This is the only complete line of work holding devices available anywhere. Designed for production, tooling, and maintenance work, there are 68 different models and types to choose from. Vise jaw sizes are from 1½" to 8". Ask for your copy of this FREE Catalog No. 205 today. The complete line with details and prices are shown.

PALMGREN PRODUCTS

by

CHICAGO TOOL AND ENGINEERING CO.
834 SOUTH CHICAGO AVE. • CHICAGO 17, ILL.

Use postpaid card. Circle No. 310

toolroom accessories and machine tools, has for ten years sold the Ring line of standard and special punches, dies and retainers.

Ettco Acquires Auto-Tap Division

Ettco Tool & Machine Co., Inc., has announced acquisition of the Auto-Tap division of Automatic Methods Corp., Hialeah, Fla. All Auto-Tap inventory and equipment will be moved to Ettco's Brooklyn plant, located at 594 Johnson Ave., where Ettco will continue production of the full Auto-Tap line.

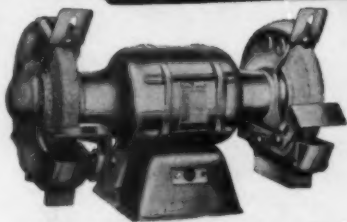
All equipment previously sold by the Auto-Tap division will now be serviced at the Ettco plant.

Dayton Perforators Expands

Dayton Perforators, Inc., Dayton, Ohio, has expanded into an adjoining building. Remodeling of the new interior is now completed.

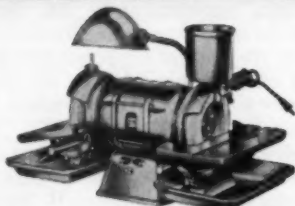
Executive offices and sales, engineering, and accounting departments occupy the new 2400 sq. ft. area, making available for additional manufacturing and shipping operations some 1600 sq. ft. in the company's first building.

MOST *Value-Packed* GRINDER MADE!



only \$112⁰⁰

CARBIDE TOOL GRINDER



Model 153-6". Reversible 1/2 HP motor, 3450 RPM. 1 1/2" wide wheels. Every part oversize for rugged, long-lasting use. Just \$201.80

BALDOR

MODEL 153-8"

Feature for feature, no other grinder offers so much for so little. Compare HP rating, wheel size, shaft diameter, bearing size with any other similar-type grinder. You'll quickly see why you get *more* with *Baldor*!

- Big 1/2 HP motor; won't burnout even if repeatedly overloaded!
- Wide-clearance design provides maximum working room!
- Large 8" first grade wheels!
- Heavier 3/4" arbor; larger ball-bearings!
- Dynamically-balanced rotor—extra smooth operation!
- Exhaust-type guards!

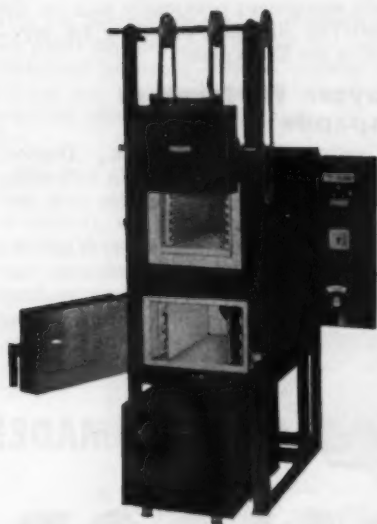
Write today for Bulletin 321N on complete line of Baldor Grinders and Buffers!

BALDOR ELECTRIC CO.

4353 DUNCAN AVE.

ST. LOUIS 10, MO.

Use postpaid card. Circle No. 311



SAVE SPACE WITH A SERIES 8055 COMBINATION MODEL

The Series 8055 is two electric heat treating furnaces (Hardening 2,000° F. and 2,300° F., and Drawing 800° F. and 1,250° F.) in the floor space of one furnace. Each furnace is independently controlled permitting hardening and drawing operations to be performed at the same time. All models are delivered with separate controls for each furnace. The 8055 series is made in nine standard sizes . . . other models are made to your specifications. Furnaces operate on standard line voltage . . . no transformer necessary. A hardening and preheating combination is also available.

Write for a free catalog of the entire Lucifer line. Engineering advice is offered without obligation. Write, wire or call . . .

LUCIFER FURNACES, INC.

NESHAMINY 1, PA.

Phone: Diamond 3-6411

Use postpaid card. Circle No. 312

1000 Mfr. Reps. Attend 35th Anniversary Show

More than 1000 representatives of metalworking manufacturers from throughout the New York-New Jersey-Connecticut area attended the five-day machine tool show held recently by the Harrington-Wilson-Daum Corp., ma-



Machine tool purchases have increased steadily since the first of the year.

chine tool distributor of Mount Vernon, N.Y., to observe the company's 35th anniversary.

John H. Daum, president, reported their current backlog of unfilled orders up 35 percent over 1958 and first quarter shipments approximately 200 percent above those of the first three months of 1958. He said he expected that prices would soon be increased by the manufacturers to offset their increased costs in labor and materials.

Anniversary visitors saw more than 50 new machine tools in action, operated by factory demonstrators. It was reported to be one of the largest and most complete working displays ever held by a machine tool distributor.

Experience—the added alloy in Allegheny Ludlum tool steels



Careful addition of sulfur to melt guarantees typical sulfide distribution, as shown in photomicrograph of longitudinal specimen of EZ MACHINING tool steel.

Sulfur addition to melt held to narrow range in Allegheny Ludlum's EZ MACHINING GRADES

**Uniform, finely-distributed sulfides
mean uniform machining, uniform high finish,
uniform long tool life order after order**

Adding sulfur, actually an impurity, to a tool steel melt to make it free-machining must be done with care and precision. That's why Allegheny Ludlum maintains an extremely close average range in adding sulfur to its EZ MACHINING grades. But mere range, however narrow, is not enough. A-L has developed special techniques in adding sulfur and nucleating agents to produce the uniform, finely-distributed sulfides that characterize good free-machining tool steels.

A-L's extra care means you can standardize your machining operations from piece to piece and order to order. This reproducibility is reflected in uniform machining; uniform high finish; uniform long tool life.

For example, in the production of hobs these machining properties in Allegheny Ludlum's EZ MACHINING steels minimize the costly "backing off" operation for back clearance of multiple teeth, eliminating complicated extra heat treatment. Lower residual stresses are set up, because the steel has a lower resistance to the cutting action. Naturally, hobbing is only one of the situations where these free-machining characteristics can benefit you.

Allegheny Ludlum stocks a complete line of tool steel sizes and grades. Call your nearest A-L representative; you'll get quick service and counsel on such problems as heat treating, machining, grade selection, etc. Or write for A-L's publication list which gives full data on the more than 125 technical publications offered. They'll make your job easier.

ALLEGHENY LUDLUM STEEL CORPORATION,
Oliver Building, Pittsburgh 22, Pa. Address Dept. MB-20

www-7200

ALLEGHENY LUDLUM

Tool Steel warehouse stocks throughout the country... Check the yellow pages
every grade of tool steel... every help in using it

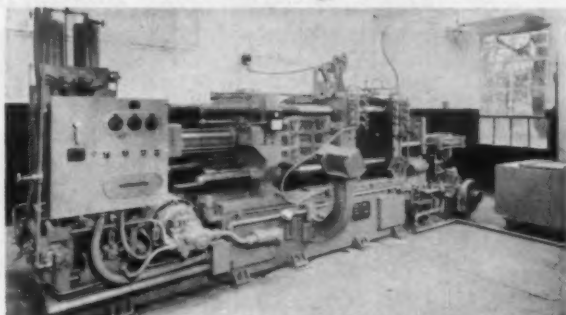


Use postpaid card. Circle No. 313

Development Center Shows Die Casting Advancements

Continuous research in die casting machine engineering, with particular emphasis on improved, low-cost designs of fully automated machines and vacuum die casting systems, is being conducted in a "Die Casting Development Center" located in the plant of the Cleveland Automatic Machine Co., Cincinnati. This facility, which is housed in its own quarters, contains two Cleveland die casting machines—one producing a zinc casting, the other an aluminum casting.

Development work in automation is carried out on the zinc machine, which is fully automated and operates at a production rate of better than 500 shots per hour using a four-cavity die.



The Model 400-N die casting machine incorporates vacuum die evacuation and automatic aluminum ladling; produces thin-walled part at rates better than 300 shots per hr.

In the Center engineers are producing castings by vacuum, using the Morton system, on the aluminum machine—a Model 400-N having 400 tons die locking pressure. A single cavity die for an extremely thin-walled part is evacuated by vacuum before each shot

KUTMORE ADJUSTABLE HOLLOW MILLS



A MIGHTY MIDGET!

This Midget Floating Holder Hollow Mill, flange type, has micrometric adjustment, and is designed to permit easy compensation for any spindle misalignment. Small, sturdy, extremely accurate!

Write For Catalog 20BB

It shows complete line of adjustable hollow mills. Our Engineering Dept. is at your disposal for special requirements.

CARL WIRTH & SON, INC.

1625 CLINTON AVE. NO. ROCHESTER 5 NY

Use postpaid card. Circle No. 314

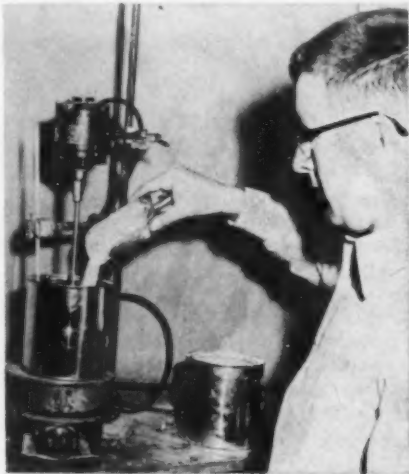
MACHINE and TOOL BLUE BOOK

is made. Vacuum is utilized for automatic aluminum ladling of metal on this machine, and castings have been made at rates exceeding 300 shots per hour.

The company has extended invitations to members of the die casting industry to schedule visits to the Development Center to see these machines in action. Their advanced features can be incorporated into any of the eight Cleveland die casting machine models.

Seminar Conducted on Use of Epoxy Plastics

"Plastic Steel" and other Devcon products were recently presented at a two-day plastic tooling seminar at

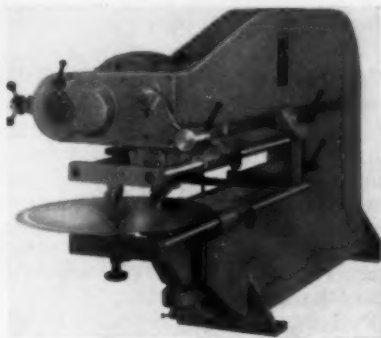


Richard T. O'Connor demonstrates Devcon products at Purdue's plastic seminar.

Purdue University, Lafayette, Ind. Richard O'Connor, research director of Devcon Corp., Danvers, Mass., and Ralph Clark, of Durrie Sales Co., Chicago, explained by colored slides and actual demonstrations how Devcon materials are used for making such items as tools, jigs, fixtures, metal forming dies, patterns. The seminar was attended by manufacturers and formulators, tool and die superintendents, and others.

INTRODUCING TO THE UNITED STATES THE MULTI-PURPOSE PIONEER

**SHEARING & NIBBLING MACHINE
FOR THE
SHEET METAL INDUSTRY**



- 7 MODEL SIZES
- 12 SHEET METAL OPERATIONS
- 10 Ga. to 11/32" CAPACITY
- WELDED STEEL CONSTRUCTION
- INFINITELY VARIABLE STROKE ADJUSTMENT

**Exclusive Franchises Available
National Distributor**

DION MACHINERY, INC.

**1116 GREAT PLAIN AVENUE
NEEDHAM 92, MASS.**

Use postpaid card. Circle No. 315



Carpenter Steel Opens New Mill Branch

A mill branch warehouse and specialty steels service center to serve eastern Pennsylvania's Delaware Valley has been opened by the Carpenter Steel Co. in suburban Philadelphia. **Robert A. Kokat**, Philadelphia district manager, will direct operations at the new center, which is one of the largest in the Car-

penter network.

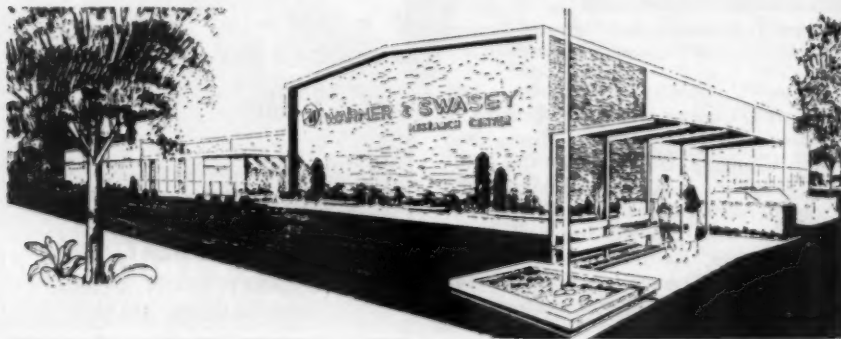
The building contains 10,000 sq. ft. of floor space and is built of steel and concrete with brick facing. Provision for efficient materials handling was made by installing a five-ton crane, overhead shipping doors, and pneumatic tube system.

Warner & Swasey to Build Research Center

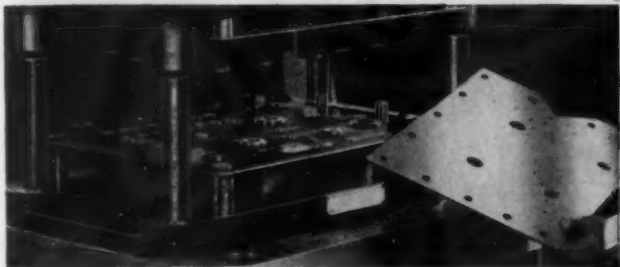
New Warner & Swasey research facilities, to be located at Solon, Ohio, will comprise 40,000 sq ft of floor space. This will include offices, research laboratories, a library, design and experimental areas, a fully equipped prototype shop, and a high-bay general test section with overhead cranes and other heavy handling equipment.

Purpose of the new facility is to centralize all of the company's research and development activities and personnel, insofar as practical, for greater

efficiency and economy. Specific research facilities will include separate machine design and systems design areas, a design and test section for servo mechanisms, a special humidity-controlled design and experimental area for textile machinery, metal cutting and metallurgical research laboratories, plus a prototype shop capable of fabricating full scale working models of new product designs. Approximately one-third of the total structure will be devoted to high-bay test facilities.

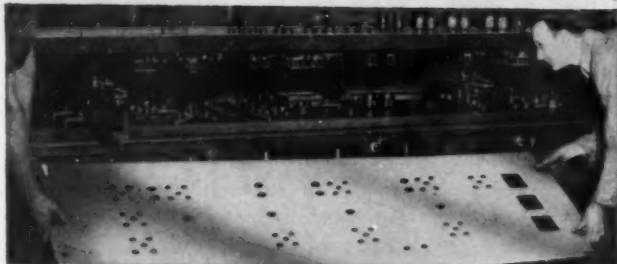


OVER 2700 PLANTS are saving money with WHISTLER DIES



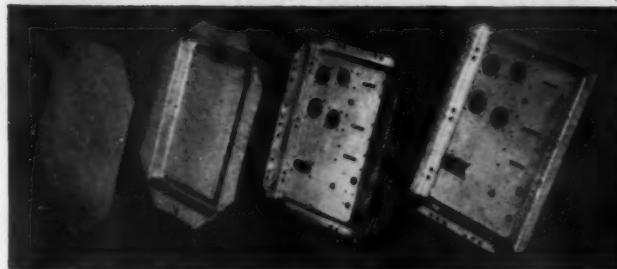
MAGNETIC PERFORATING DIES

All parts reusable and interchangeable. Punches and dies stocked in .001" increments from .100" thru .500" dia. Larger sizes available.



ADJUSTABLE PERFORATING DIES

All parts reusable and interchangeable. Punches and dies stocked in .001" increments from .100" thru .500" dia. Larger sizes available.



manufacturer
of all types of
CUSTOM DIES
for over 40 years

**WRITE FOR
COMPLETE DETAILS**

S. B. WHISTLER & SONS, INC., 746 Military Rd., Buffalo 23, N. Y.

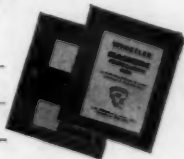
Mail the following: ☐ Megna-Die Catalog ☐ Adjustable Die Catalog
☐ More information on custom die work

NAME _____ TITLE _____

COMPANY _____

STREET _____

CITY _____ ZONE _____ STATE _____



Use postpaid card. Circle No. 316

Besly-Welles Launches New Grinding Test Laboratory

A new grinding test laboratory has just been completed by the Besly-Welles Corp., South Beloit, Ill. It will be used to study customers' grinding problems under simulated production conditions.

Disc grinding equipment of advanced design has been installed, as well as the latest double-spindle horizontal and vertical disc grinders. Modern inspection equipment is used to check finished parts.



Norton Buys G&E Assets

Norton Company, Worcester, Mass., has purchased the inventories, machinery and equipment of Gould &

Eberhardt, Inc., Irvington, N.J. These assets will soon be moved to Norton's machine tool plant at Worcester, for manufacture of the Gould & Eberhardt line of shapers and gear hobbing machinery. Sales will be continued through present distributors.

NOTHING

heats like ...

is more modern than ...

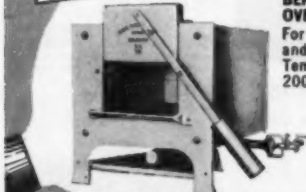
is more economical than ...

GAS

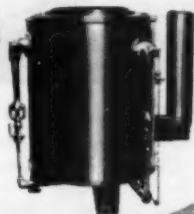


INDUSTRIAL GAS BURNERS & FURNACES

for Clean, Fast, Quiet Heat-Up at Lowest Cost!



BENCH TYPE OVEN FURNACES
For heat treating and pre-heating. Temperatures to 2000° F.



ATMOSPHERIC POT FURNACES
For cyanide, salt bath and lead hardening. Temperatures to 1650° F.

Write for complete "BUZZER" CATALOG



CHARLES A. HONES, INC.

Est. 1911

129 So. Grand Avenue, Baldwin, L.I., New York • BALDWIN 3-1110

"BUZZER" Burners & Furnaces for Heat Treating, Melting, Soldering

Use postpaid card. Circle No. 317

Death Takes Two Lincoln Electric Officials

John Cromwell Lincoln, 92, founder of the Lincoln Electric Co., Cleveland, and Alton Frank Davis, vice president



J. C. Lincoln



A. F. Davis

and secretary of the company, died recently—within hours of each other.

Mr. Lincoln was president of his company until 1928, when he became board chairman and turned operations over to his younger brother, James. John Lincoln developed many of the company's products himself and was issued more than 50 patents for electrical devices, among them the variable speed motor. He was a pioneer in the development of ductile welds.

An ardent champion of the single tax, he ran for vice president of the United States on the Commonwealth Land Party ticket in 1924. Through the years, Mr. Lincoln wrote numerous pamphlets and books espousing the single tax economic theory.

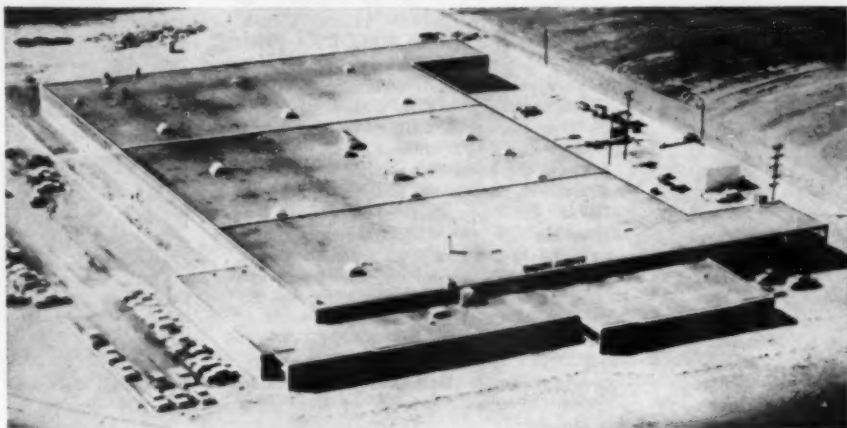
Mr. Davis, 69, had been in failing health for several months. His career with the Lincoln Electric Co. was exceeded in length only by the careers of John and James Lincoln. He was hired as a salesman following his graduation from Ohio State University in 1914. In 1925 Mr. Davis became a director and vice president of the company; he was made secretary in 1938.

When the James F. Lincoln Arc Welding Foundation was created in 1936, Mr. Davis was appointed its secretary. The A. F. Davis Welding Library, established by him at Ohio State University in 1942, is the most extensive welding library in the world. In 1954 the American Welding Society gave him the Samuel Wylie Miller Medal for his contributions to welding education.

New T-J Facilities Completed

The Tomkins-Johnson Co. has recently moved into its new manufacturing and office facilities located at 2425 W. Michigan Ave., Jackson, Mich. The

plant is situated on a 13-acre plot of ground and comprises approximately 114,000 sq ft of building space.



Appointments and Promotions

Personnel Changes . . . Executive and Production



I. W. Killian



J. J. Jaeger



A. J. Vogl



Wm. Ferrick

Irwin W. Killian has been elected president and chief executive officer of the Pines Engineering Co., Inc., Aurora, Ill. . . . **Jacob J. Jaeger**, formerly executive vice president of Pratt & Whitney Co., has recently been elected president. He succeeds **Edward P. Gillane**, who has been elevated to the position of assistant to the chairman of the board. Election of **Edward J. Shages** to the board of directors has also been announced. He is vice president in charge of manufacturing. . . . **Kenneth D. Bowman** has been elevated from personnel manager to director of personnel at Vanadium-Alloys Steel Co., Latrobe, Pa. . . . **M. J. Steffes**, vice president of Super Tool Co., Detroit, has been elected executive vice president of the company. . . . **Wilton Tool Mfg. Co., Inc.**, Schiller Park, Ill., has announced the appointment of **Alex J. Vogl** to the office of president, and **William Ferrick** to that of vice president-sales manager. . . . **E. D. Vancil** has officially retired as manager of the Meta-Dynamics Division of the Cincinnati Milling Machine Co. The new manager of this division is **Heward W. Carlisle**. . . . **Thomas F. Haskins**, supervisor of the accounts payable department, has been named senior buyer at Rockwell Mfg. Co., Pittsburgh. . . . The election of **Philip C. Sayres**, vice president and a director of the American Can Co., as director of the Capewell Mfg. Co., Hartford, Conn., has been announced. . . . **John Moxen** has been elected president, and **Frank R. Palmer**, chairman of the board of the Carpenter Steel Co., Reading, Pa. Both men assumed their new posts July 1. . . . **William Coon**, director of engineering, has been appointed as technical assistant to the president of Simpson Electric Co., Chicago. **Peter De Paolo**, chief Engineer, was appointed director of engineering. **Irvin Rebeschini** has been appointed chief engineer of electronic



K. D. Bowman



M. J. Steffes



H. W. Carlisle



T. F. Haskins



John Moxon

test equipment, and **Ed Evensen**, chief engineer of automotive test equipment. ...The American Gage & Machine Co. has announced the appointment of **Arch Weindorf** as treasurer. Weindorf formerly held the position of controller of Simpson Electric Co., a subsidiary of American Gage & Machine Co. ...**Joseph C. Olson** has been elected vice president, manufacturing of the Bullard Co., Bridgeport, Conn. ...**Victor Del Greco** has been appointed as superintendent of micrometer assembly operations at J. T. Slocomb Co., South Glastonbury, Conn.



P. C. Sayres



J. C. Olson

Personnel Changes . Sales and Service

Mel Bushring, sales manager for Simpson Electric Co., Chicago, has been appointed director of sales. **William Johansen**, assistant sales manager, was appointed sales manager of the instrument division. **Lowell De Wolf** has been named sales manager of the automotive division. ...**Andy Bryant** has joined New York Twist Drill Co., Inc., New York, as chief service engineer. He was previously on the service engineering staff of National Twist Drill Co. ...**W. O. Murray**, heretofore manager of distributor sales in the Pittsburgh-Buffalo-West Virginia district, has been appointed product manager of hose and hose fittings for the Parker-Hannifin Corp., Cleveland. ...**Norman F. Weyland**, formerly manager of the Midwest division, has been made general sales manager for Wales-Strippit, Inc., Akron, New York. Succeeding Weyland as Midwest division manager is **John Rinaldo**, who has been handling the Tulsa, Okla., territory. **Joseph L. Stella** has been appointed as advertising and sales promotion manager. Stella also holds the position of export manager. ...**Baxter Fullerton**, former assistant to the vice president in charge of sales at the Warner & Swasey Co., Cleveland, now heads a new department as director of marketing services. ... New sales manager for the R. K. LeBlond Machine Tool Co., Cincinnati, is **Robert E. McKee**, formerly sales engineer and director of technical and engineering training. ...**Charles H. Tuttle, Jr.**, is now field



F. R. Palmer



Victor Del Greco



B. T. Fullerton



R. E. McKee



C. H. Tuttle, Jr.

Peaslee
PRECISION
MINIATURE

Actual Size



DOWEL PINS

We specialize in precision, stainless steel Pins, Dowels, Shafts. Quantity production of standard sizes includes miniature, instrument type pins, as small as .020 dia. For prompt quotations on your blueprints...

WRITE TODAY TO

THE PEASLEE METAL PRODUCTS INC.
470 Tolland St. • East Hartford 8, Conn.
Use postpaid card. Circle No. 318

RIVETERS...

GRANT

PIONEERS
and
PACEMAKERS
in their line



—head rivets from smallest to 1/2" diameter either by NOISELESS SPINNING or VIBRATING HAMMER method—sizes to meet all needs—types include Vertical and Horizontal Multiple Spindle.

Write for literature and don't forget to send samples

THE GRANT MFG. & MACHINE CO.
CE Station Bridgeport 5, Conn.

Use postpaid card. Circle No. 319

178

representative for Allen Mfg. Co. in the Chicago territory. . . Raybestos-Manhattan, Inc., Passaic, N.J., has announced changes in its sales structure. **R. E. Parks**, formerly San Francisco district manager, has been appointed assistant sales manager for industrial rubber products and packings. A new marketing group section of its sales division has been established. **S. J. Synnott** has been appointed general marketing manager of industrial rubber products, and will direct activities of managers assigned to specific products. Members of this new group are: **H. J. Seeley**, market-



R. J. Dietz

J. R. Moore

ing manager for Poly-V drives and flat transmission belts; **A. Arguedas**, for conveyor and elevator belts; **J. J. Connors**, for rubber covered rolls. **G. E. Horvath** has been made marketing manager of mechanical packings. . . **Richard J. Dietz** has been appointed as district sales representative for the E. W. Bliss Co., covering the northern Ohio and Indiana territory. . . **Jesse R. Moore** has been named manager of the Central division of Atkins Saw Div., Borg-Warner Corp. Moore has been employed by the Indianapolis saw firm for the past 17 years.

**SPECIAL RECESS AND STANDARD
SNAP GAGES "made to AGD"
STANDARDS**



Sketch shows! GS-5 Recessed Snap Gage to Check Dimensions in undercut on Shafting

**H. v. H TOOL
& Instrument Co.**

204 Lafayette St.

N. Y. 13, N. Y.

Use postpaid card. Circle No. 320

MACHINE and TOOL BLUE BOOK

free 84-PAGE CATALOG

One Complete Source of Detailed
Specifications for Designers,
Production Managers,
Toolroom Foremen

Hundreds of NEW ITEMS

ALL NEW — Complete specifications and cost saving data on over 2000 "Standards", including world's largest line of work-holding equipment, chuck jaw blanks, handles, knobs, wheels, strap clamp assemblies, forged items, plus hundreds of other jig and fixture components. Detailed specifications, engineering drawings. The one complete source for data on all the "standards" for tool, die, jig, and fixture design and application. Write for your FREE copy today.

JERGENS TOOL SPECIALTY CO.

Dept. MT-8 712 E. 163rd St., Cleveland 10, Ohio

JUST OUT!
NEW 1959 EDITION



Use postpaid card. Circle No. 321

Gage Block Precision means GRADE "A" ACCURACY*



with
**ULTRA-
CHEX
GAGE
BLOCKS**

**82
PIECE
SET...**

NOW ONLY \$249.50

*Grade "A" Accuracy:
-.000002" and +.000006"

For complete information request our 96 Page Catalog
of any one of our 3 "Coast to Coast" locations

SCHERR-TUMICO

PRECISION MEASURING TOOLS AND INSTRUMENTS

Eastern Office: GEORGE SCHERR CO., INC.

200 Lafayette Street • New York 12, N. Y.

Midwest Office and Factory: TUBULAR MICROMETER CO.

St. James, Minnesota

West Coast Office: SCHERR-TUMICO CO.

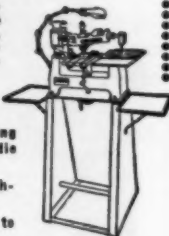
3327-39 West Olympic Blvd. • Los Angeles 19, Cal.

Use postpaid card. Circle No. 322

how to get faithful 3-dimensional reproduction

in steel, other metals and plastics

Use the LOW COST precision-built Preis Panto 3D-5 Engraving Machine. Does both 2 and 3 dimensional engraving effortlessly.



- Reversible spindle for enlarging or reducing from a model, die or sample
- Precision ball bearings throughout
- Reduction ratio range—1.6:1 to 7:1
- Four spindle speeds—7,000 to 18,000 RPM
- Micrometer adjustment collar
- Provided complete with floor stand and work tables

TRADE MARK



Write for complete details and prices.
For immediate attention write directly
to manufacturer below. Ask for nearest
representative.

H. P. PREIS ENGRAVING MACHINE CO.
645 U.S. Route 22 Hillsdale, N.J.
Use postpaid card. Circle No. 323

New Dealers and Distributors

Company

Viking Tool & Steel Co.

R. C. Neal Co., Inc.

Address

1039 Niagara St.
Buffalo, N.Y.

78 Pearl St.
Buffalo, N.Y.

Distributor for

Taft-Palmer Mfg. Co.
Woonsocket, R.I.

Rivett Lathe & Grinder, Inc.
Boston, Mass.

Films and Books

Manufacture of Welded Stainless Tubing

A new film, "Forming for Uniformity," shows the production of uniform welded stainless tubing and pipe. Covering the entire process of manufacture, the movie begins with the melting and refining of raw materials, continues with the hot and cold rolling of strip, and then follows forming, welding, annealing, cleaning, testing, analyzing, labeling and packaging of the complete tubular product.

Movie is 16 mm in color with sound; running time is 30 minutes. It is available for showing to local groups of

engineering and technical societies from Sales Promotion Dept., Alloy Tube Div., the Carpenter Steel Co., Union, N.J.

THE METAL THORIUM. Published by the American Society for Metals, Technical and Engineering Book Dept., 7301 Euclid Ave., Cleveland 3. \$10

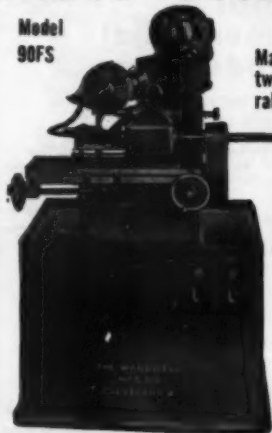
Dual emphasis is given practical engineering problems and techniques, and theory and research in this book. It is intended as a reference source on all that is new and known about thorium as an energy source and as a metal with broad industrial application possibilities.

The book's 22 chapters, by 36 experts, cover thorium in both nuclear and non-nuclear aspects, including discussion of the role of thorium in magnesium technology.

Practical subject matter includes preparation of thorium oxide and iodide thorium, development of thorium tetrafluoride, the calcium process, and fabrication and cladding.

Flute Grinder

Model
90FS



Make your own
twist drills, spiral
or straight
reamers and
end mills
from solids
on a production
basis and
save money.

Write
for
Bulletin

WARDWELL

3807 Ridge Road

Cleveland 9, Ohio

Use postpaid card. Circle No. 324

180

New Ideas in Cutters

★ Designers and manufacturers of H. S. S., tantung, and carbide cutters based on cost saving principles. Form relieved, hard faced cutting edges, throwaway inserts, welded bodies, semi-finished blanks, clamped-on blades. Serving America's metal working, carbon, graphite, valve, and instrument manufacturers. Write or phone LUDLOW 8400 for latest catalog.

NIAGARA CUTTER

Division of Bollier-Damerell, Inc.
336 Niagara St., Tonawanda, N. Y.



Use postpaid card. Circle No. 325

MACHINE and TOOL BLUE BOOK

See Your **COST DIFFERENCE** with this **DIFFERENT** **FINISHING** **MEDIUM**



IMMEDIATELY AVAILABLE!

The Only Complete,
Comprehensive Line of Service
Proved
STOCK NUMBERS

Say goodbye to many older, costlier metal-
working methods!

WRITE NOW FOR:

- **SAMPLE BRIGHTBOY HAND
TABLET**
- **CATALOG LISTING GRAINS,
TEXTURES, MACHINE SPEEDS**
- **NEW METHOD
RECOMMENDATIONS**
and for name of nearest Brightboy
distributor

**BRIGHTBOY INDUSTRIAL DIVISION
WELDON ROBERTS RUBBER CO.**

95 North 13th Street • Newark 7, N.J.
America's Pioneer Manufacturer of Rubber-Bonded Abrasives

Time-Savings Up to 50%

**Burring • Cleaning • Finishing
Polishing—frequently in one operation!**

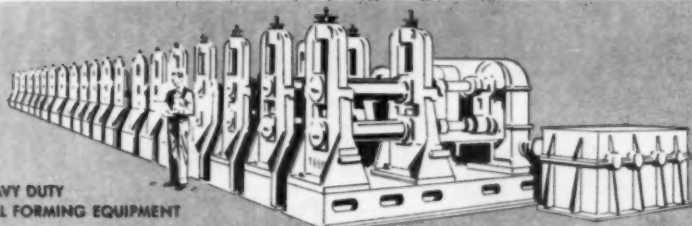
Brightboy, the different finishing medium,
will give you a broader, wider concept of
applications never associated previously
with abrasives.

Brightboy's original formulation is the rea-
son for its exceptional time savings and
versatility. Abrasive and rubber work
simultaneously in an amazing action.
Wheels, sticks, rods and blocks are **JOB-
MATCHED** to your machine and manual
operations. A wide range of Silicon Car-
bide and Aluminum Oxide grains and tex-
tures, grades extra fine to extra coarse, in
soft, firm and tough rubber binders.

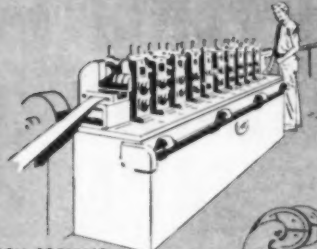


Use postpaid card. Circle No. 326

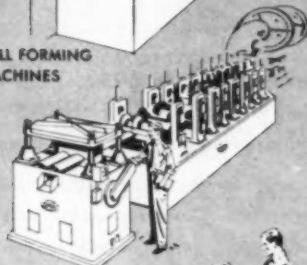
HEAVY DUTY
ROLL FORMING EQUIPMENT



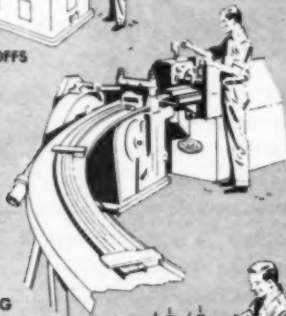
ROLL FORMING
MACHINES



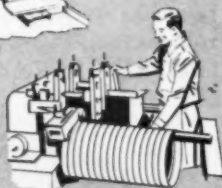
CUT-OFFS



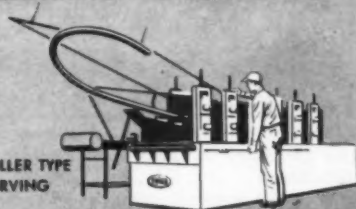
CURVING
ATTACHMENTS



COILING
EQUIPMENT



ROLLER TYPE
CURVING



YODER COLD ROLL-FORMING EQUIPMENT

for profitable mass production

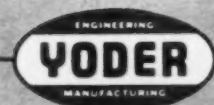
High speed, YODER Cold Roll-Forming machines are the most economical method for mass producing structural or ornamental shapes. One machine with one operator can form up to 40,000 feet of shapes per day. Even on a part-time basis, a YODER Cold Roll-Forming machine can prove to be a profitable investment.

YODER flexibility works for you too, curving, coiling, ring forming, multiple roll-forming and embossing—on a wide variety of metals—can be incorporated into your production line. Practical, YODER-engineered design minimizes maintenance and downtime... assures uniformity, accuracy and reliability of your end product.

In addition to Roll-Forming machinery, YODER also makes a full line of Rotary Slitting equipment, Pipe and Tube mills. Send for the fully descriptive Cold Roll-Forming Book.

THE YODER COMPANY

5509 Walworth Ave. • Cleveland 2, Ohio



COLD ROLL FORMING MACHINES

PIPE AND TUBE MILLS (ferrous or non-ferrous)

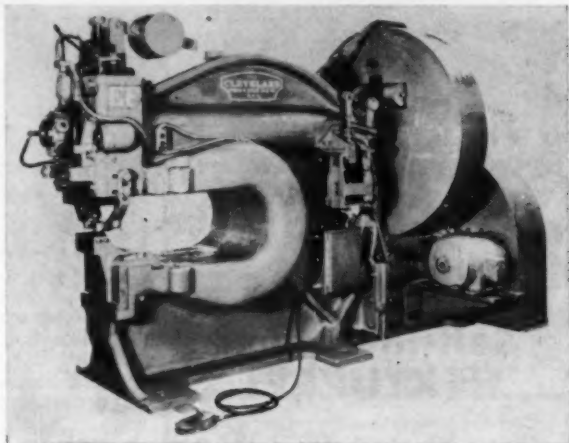
ROTARY SLITTING LINES

Open Gap Machine Punches Heavy Steel Plate

Featuring a solenoid-operated clutch and completely guarded gears and flywheel, the Cleveland Type EF vertical open gap machine is designed for greater safety and precise operating control. Built for a leading steel supplier, this machine will be used in fabricating heavy steel plate and structural I-beams and girders. In addition to its punching attachment, it can also be equipped for flue hole punching, notching and coping as well as shearing angles, plates and bars.

Its solenoid-operated clutch automatically stops the machine at the end of each operating cycle. Each operation requires the operator to release the pedal and then push it down again to start the new cycle, in order to eliminate automatic repeating of the operation by the machine as the result of the operator keeping his foot on the pedal. This machine is also available with conventional, automatic type operation for cases where this solenoid produced semi-automatic action is not desired.

Machine has a punching pressure of $97\frac{1}{2}$ tons with sufficient capacity to punch a $1\frac{1}{4}$ " hole through steel 1" thick, enabling the operator to fabricate all standard and Bethlehem sections from 7" I-beams to 30" girders, including 14" columns punched in the



Solenoid-operated clutch for precise operating control.

flange and web. It is also capable of shearing $\frac{7}{8}$ " plate, and will square shear angles $4" \times 4" \times \frac{1}{2}"$. Machine can be furnished with throat depths from 12" to 60".

Cleveland Punch & Shear Works Co.,
3919 St. Clair Ave., Cleveland 14, Ohio.

Use postpaid card. Circle No. 81

Automatic Deburring Method Saves Time, Money

A new concept in the automatic deburring of gears and sprockets has been announced by Minnesota Mining and Manufacturing Co., St. Paul, Minn., and Barber-Colman Co., Rockford, Ill. Two advantages of the method are claimed: consistency in profile from tooth to tooth and from gear to gear; complete protection for the gear face.

The deburring is accomplished as a



**SPEEDS UP
PRODUCTION**

**CUTS
COSTS**

ENCO Self-Indexing HEXTURRET

Convert your lathes for turret work this quick, easy way. ENCO HEX-TURRET gives you the accuracy, rigidity and speed you need to step up lathe production and cut "per piece" costs. Easy as mounting your lathe tailstock. Does both normal and heavy lathe and screw machine work, drilling, counter boring, counter sinking, spot facing, reaming, turning, boring, etc. Fit all lathes 9" to 16" swing.

Mail coupon for cat. #53 and name of nearest Enco Franchise Dealer.

ENCO Mfg. Co.
4520 W. Fullerton
Chicago 39



ENCO Manufacturing Co.
4520 W. Fullerton,
Chicago 39, Dept. 289

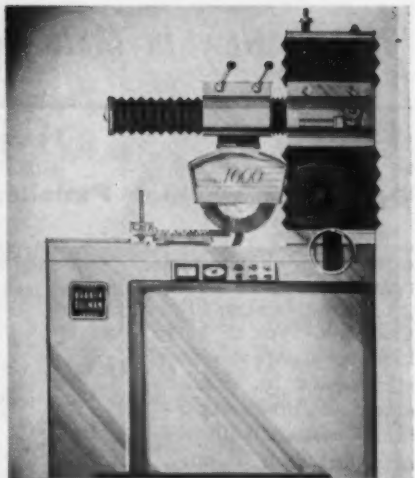
Please send catalog #53 and full details of
ENCO HEXTURRETS.

Name

Firm

Address

Use postpaid card. Circle No. 328



Model 1600 Barber-Colman gear deburring machine uses PG wheels to deburr helical and spur gears as well as sprockets.

formed PG wheel moves by hydraulic action into working position, automatically feeds into contact with the gear, and retracts to the starting position at the end of a prespecified contact period—all on a push-button cycle. The wheel and gear spindles operate in a timed relationship so that the work indexes one tooth for each revolution of the wheel.

The wheel is made of hundreds of die cut leaves of coated abrasive—in this instance aluminum oxide mineral resin-bonded to a cloth backing. It permits the grinding of a small chamfer on the complete tooth profile, which is especially important on helical gears where the acute angle on one side of the profile may distort or burn during hardening.

Using the new method, an implement manufacturer's deburring costs on a 24-tooth sprocket were reduced from 27½¢ to 7.4¢ and worktime-per-sprocket (two sides) was slashed from three minutes (by hand grinding and brushing) to 40 seconds.

Use postpaid card. Circle No. 82

Thread Chaser Grinding Flat Threads, Grooved Profiles

The Reishauer BS thread chaser grinding machine has recently been introduced in the United States by Cosa Corp., 405 Lexington Ave., New York 17, N.Y.

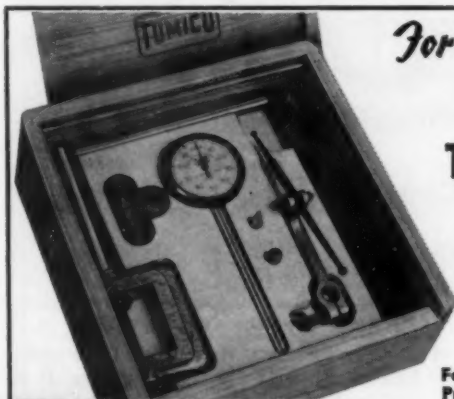
It is specially designed for grinding all types of flat threads and grooved profiles—such as those found on chaser dies, flat rolling dies, racks. The rigid construction of the machine affords accurate profiles and excellent surface finish, and makes it particularly suitable for mass production.

Operated exclusively with multi-ribbed grinding wheels up to 4" wide, grinding wheel profiling occurs on the machine by means of hydraulically



Profiles through hydraulically controlled profile crushing.

controlled profile crushing. Feed or in-feed is performed by horizontal movements of the grinding wheel slide. The workpiece table is inclined at 30° from the horizontal. Worktable speeds are controlled by a variable hydraulic delivery pump. For setting the required



*For Precision
and Reliability*

Tumico "SUPER-SET"
**UNIVERSAL PRECISION
DIAL TEST INDICATOR SET**

*Complete Set
Now Only*

\$2150

For the Complete Story of this Outstanding Precision Tool — Contact any of our 3 "Coast to Coast" Locations or your nearest Local Distributor.

**SCHERR
TUMICO**

PRECISION MEASURING
TOOLS AND INSTRUMENTS

Eastern Office: GEORGE SCHERR CO., INC.
200 Lafayette Street • New York 12, N. Y.

Midwest Office and Factory: TUBULAR MICROMETER CO.
St. James, Minnesota

West Coast Office: SCHERR-TUMICO CO.
3337-39 West Olympic Blvd. • Los Angeles 19, Cal.

Use postpaid card. Circle No. 329



PORTABLE HONES

SAVE MANY HOURS IN PRODUCTION,
SALVAGE, JOB LOT, MAINTENANCE
AND TOOL ROOM

More than 100,000 satisfied users testify to the utility of these "Tools of a Thousand Uses" for internal diameter work in nearly all materials.

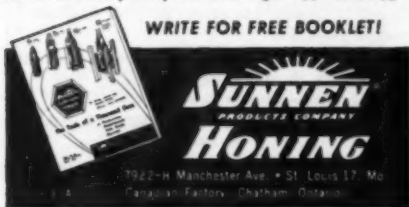
Sunnen Portable Hones are guaranteed to produce geometrically round, straight bores—accurate within .0005"—with any desired cross-hatched, lubricant-retaining finish.

Corrects Errors	Fastest Stock Removal
Exact Size Control	Positive Adjustment
Controlled Finish	Portable, Yet Rugged
Operates in any Position	

Your Sunnen Field Engineer will be glad to help you solve your sizing problems at no obligation to you.

SN-75 Midget Hone	Range 1 1/4" to 2"
JN-95 Junior Hone	Range 2" to 2 1/2"
AN-112 Standard Hone	Range 2 1/2" to 7"
AN-812 Heavy Duty Hone	Range 4 3/4" to 20 1/2"

WRITE FOR FREE BOOKLET!



Use postpaid card. Circle No. 330

pitch angle in grinding radial chaser dies, the worktable can be swiveled $\pm 6^\circ$ in either direction. To grind the desired taper in radial dies, the table can also be tilted by $\pm 6^\circ/00$ relative to the grinding spindle axis.

A special indexing device on the machine also makes it possible to grind workpiece surfaces of a regular polygon shape—such as broaches—to a maximum length of 14".

Specifications: minimum pitch, 32 tpi; maximum pitch, 4 tpi; maximum stroke of table, 16".

Use postpaid card. Circle No. 83

Metal Disintegrator

A new type of metal disintegrating machine, the Model J-2, removes broken taps, drills, reamers, studs, screws. It is recommended for burning shaped holes into hardened metals, cutting keyways, extending oil lines.

The disintegrator operates on an electro-magnetic principle which elim-



Model J-2 has no springs, drive pins, fiber pads.

inates all springs, drive pins, fiber pads, helical copper coils and solenoids. It is reported to have more controlled drive and lift power, more sensitive vibration control for very small diameter holes, without damage to the threads in a tapped hole or to the metal adjacent to the hole being made.

Jiffy Disintegrators, Inc., 1503 E. 11 Mile Rd., Royal Oak, Mich.

Use postpaid card. Circle No. 84

Numerically Controlled Turning and Boring Machine

Numerically controlled, double spindle turning and boring machine precision machines inside and outside contours of hemispheres, cylinders, and other related metal parts with infinite variations from a hemispherical contour to a repeatability of 0.0001-inch.

The two-axis numerical control system was designed and built cooperatively by the Heald Machine Co., Worcester, Mass., and the Industrial Controls Section, Bendix Aviation Corp., Detroit, Mich.

In many instances, tolerances of plus-minus 0.000070-inch are achieved to maintain critical inside and outside



Heald Bore-Matic turning and boring machine equipped with a Bendix numerical control system produces hemispheres, cylinders, free form turned shapes, and other hollow metal parts to extremely close tolerances.

diameters. The Bendix numerical control system provides a command pulse value to each of the two machine slides of 0.000025-inch or 40,000 pulses per

How SQUARE HOLED SLEEVES SPEED UP TOOL-MAKING!

One of the most difficult problems in tool making can be solved easily and quickly with Sturdy Square Holed Sleeves. The perfection of broached square holes can be had in boring bars, milling cutters and many other applications at a small fraction of the cost of imperfect hand-made square holes. The Sturdy Square Holed Sleeve consists of a round sleeve with a perfectly square hole broached through the center. This hole is tapped at one end to receive a back-up screw which is furnished with the Sleeve. The Sleeve can be sweated or pressed into a drilled and reamed hole to make a perfectly square accurate hole in a very few minutes.

The Sturdy Square Holed Sleeve will save you many hours and many dollars in the making of boring bars, tool holders and other tools requiring square holes.

SLEEVES MADE IN FOLLOWING SIZES:
3-16, 1-4, 5-16, 3-8, 7-16, 1-2, 5-8, 3-4, 1"

STURDY BROACHING SERVICE, INC.
23516 TELEGRAPH ROAD • DETROIT 41, MICH.

*Write for
Literature*



Use postpaid card. Circle No. 331



MORE REACH for the Tapping Head

You can machine tap in deep holes and awkward locations with ordinary, standard taps plus Walton's NEW "Style B" Extensions. Single units fit together to make a rigid, closely aligned assembly, for either machine or hand tapping operations. Adaptable to all standard taps from No. 0 to $\frac{1}{2}$ ". A complete, boxed set of 9 tools lengthens taps from 8" to 28 $\frac{1}{4}$ ". Eliminates the need and cost of expensive, "long" taps.

Write for Specifications and Data Sheet No. 12. These new extensions will be sent for 30 days Free Trial, if requested.



Use postpaid card. Circle No. 332

inch of slide travel.

In operation, one spindle of the machine tool is used to machine the outside diameter and the other spindle is used to machine the inside diameter of the part. Only one spindle at a time is operated on this machine.

The workpiece is clamped in a rotating fixture attached to the spindle. A single point tool, which is mounted on two hydraulically operated slides, is numerically controlled in two axes (longitudinal and transverse) to machine the desired part shape to extremely close tolerances. Any number of different part shapes can be machined with only one machine tool.

Use postpaid card. Circle No. 85

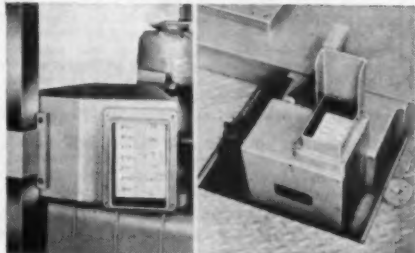
Optical Measuring System for Horizontal Boring Mills

An optical measuring system for horizontal boring, milling, and drilling machines, the Tele-Vernier, increases the accuracy and speed of reading vernier scales for vertical and horizontal movements of a boring mill.

The image of the long stainless steel scale, graduated to $1/40$ ", is projected on a ground glass about 3" x 5". Vernier scale is etched on the screen and has 25 graduations. About .6" of scale is projected. This large screen image enables the operator to read the optical projection device quickly and accurately.

Cincinnati Gilbert Machine Tool Co., 3366 Beekman St., Cincinnati 23, Ohio.

Use postpaid card. Circle No. 86



Tele-Vernier increases accuracy and speed of reading vernier scales for vertical and horizontal movements of a boring mill.



**"most used
grinder"
say customers**

In checking with the tool, die, gage and general production shops that use SANFORD SURFACE GRINDERS, the most frequent comment was that Sanford Grinders were the "most used" of any grinders in the shop.

**WET
or DRY Model MG**

PARTIAL SPECIFICATIONS—

Capacity — 8" x 12" x 12".
Table travel — 13", traverse 8 $\frac{3}{4}$ ".
Vertical clearance 12" under 7" wheel.
Standard grinding wheel—7" x 1 $\frac{1}{2}$ ", 1 $\frac{1}{4}$ " hole.
Spindle speed approx. 3000 RPM.
Motor, $\frac{1}{2}$ HP, single or 3 ph., dynamically balanced.
Floor space—45" x 38" x 62" high.
Net wt. with stand approx. 630 lbs.

Others have tried to copy but there's a "feel" that comes from the precise individual quality and workmanship that goes into every SANFORD GRINDER. It's the factor that can't be found in any other grinder.

So widely used you can ask users in your own area how they like the low priced Sanford Surface Grinder.

Write for illustrated and fully descriptive literature, reconditioning facilities, optional equipment and prices.

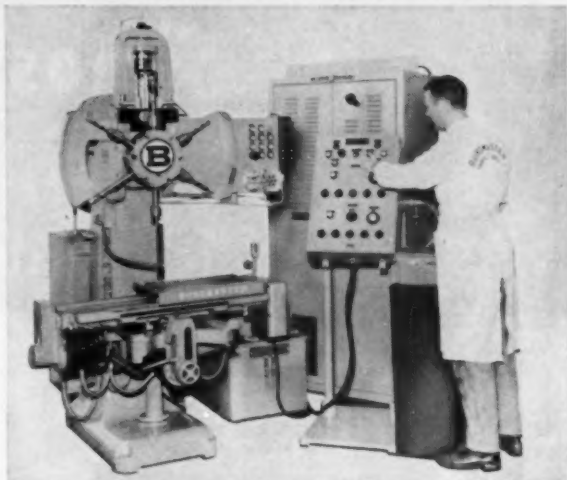
Representatives in major industrial areas

SANFORD MANUFACTURING CORP.
1026 Commerce Ave., Union, N. J.

Turret Drilling Machines' Hydraulic Circuit Improved

An improved hydraulic circuit for the Burgmaster 2-BH and 3-BH automatic hydraulic turret drilling machines is said to insure a positive constant feed rate, in and out, whether the machine is cutting air or actually machining a part. In tapping, the hydraulic circuit eliminates the possibility of pulling out the last thread or opening up the size of the threaded hole.

With a Vickers pressure compensating hydraulic valve, oil is metered in and out of the head end of the cylinder, thereby disregarding any changes



3-BH automatic hydraulic turret drilling machine showing improved control for new hydraulic circuit. Picture also shows flow meter and compensating control valve.

in feed which might result from the volume of the hydraulic cylinder rod. Addition of a pressure compensating flow control valve permits accurate calibration of the flow meter. The flow meter, which is extra equipment, is mounted on the machine control panel and indicates the spindle feed in inches per minute, permitting more rapid set-ups and assuring proper feed rate for each tool.

Burg Tool Mfg. Co., Inc., 15001 S. Figueroa St., Gardena, Calif.

Use postpaid card. Circle No. 87



MULTIROLL FILES

Depth	11 1/4"	22 1/4"	30 1/2"	36 1/2"	42 1/4"
49 Tube	49AB	49CD	4930	4936	4942
1 1/4" I.D.	\$7.50	\$9.50	\$12.80	\$13.80	\$14.80
MODEL					
25 Tube	25AB	25CD	2530	2536	2542
2 1/4" I.D.	\$7.00	\$9.00	\$11.80	\$12.80	\$13.80

• SOLD DIRECT ONLY Write to Dept. Bt
F.O.B. St. Clair Shores, Mich. • PRescott 3-2515

ROLL & FILE SYSTEMS, INC. P. O. BOX 3863 P
DETROIT 5, MICH

Use postpaid card. Circle No. 334

"Jorgensen"
and
"Pony"

CLAMPS




ADJUSTABLE CLAMP CO.
the clamp folks
403 N. Ashland, Chicago 22, Ill.

Ask your
Supplier.
Send for
FREE
32-page
catalog show-
ing complete
line of styles
and sizes.

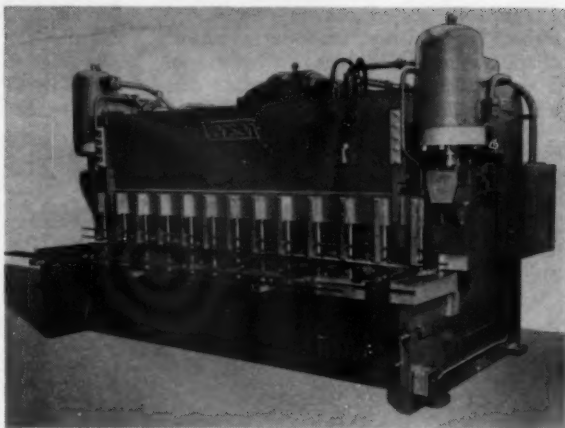
Use postpaid card. Circle No. 335

MACHINE and TOOL BLUE BOOK

New Hydraulic Shear Line Announced

A new line of hydraulic shears is now available from Verson All-steel Press Co., 9300 S. Kenwood Ave., Chicago. Shear capacities of standard models range from 8 ft lengths of $\frac{3}{8}$ " mild steel through 12 ft lengths of $1\frac{1}{2}$ " mild steel. They will shear any material within the capacity of the machine, and are claimed to produce a better shear edge than can be obtained with a mechanical shear of comparable capacity.

The shears are designed with a minimum shear angle of $1/16$ " per ft, eliminating curling of the sheared piece—a definite asset when working with light gauge materials.



Model HPS-750-12. Cap.: 12 ft. lengths, $\frac{3}{4}$ " mild steel.

Power operated back gauges are controlled and operated from the front, easily accessible to the operator.

Use postpaid card. Circle No. 88











NOW! Cut Costs! Use Highest Precision WOHLHAUPTER Facing and Boring Masterheads

Facing, Boring, Turning, Recessing, Undercutting, Underfacing and Tapercutting

- Automatic Feeds
- Automatic End Release
- 9 Sizes for Work to $36\frac{1}{4}$ "
- 12 Feeds in Larger Models

Also Tapercutting Heads for 0-180°



KARL A. NEISE
Dept. MT-89
404 - 4th Ave., N.Y.C. 16

FREE! For illustrated catalog containing complete technical data, write today!

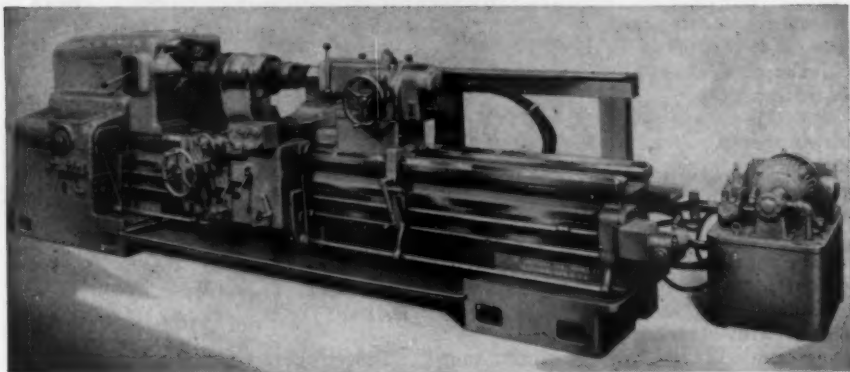
Sole Agents:

Use postpaid card. Circle No. 336

Roll Duplicating Lathe Has Self-modulated Carriage Feed

Hydraulic roll duplicating lathe, designed for accurate contour machining of mill shape rolls up to 33" diameter, is equipped with a new template controlled hydraulic duplicating mechanism

and 90° tool slide. This single slide handles all roll tracing work. Carriage feed is continuous, with the rate of feed automatically modulated as the steepness of the contour varies. Feed rate



Roll duplicating lathe provides a continuous, uninterrupted cut from one end of the roll body to the other, generating automatically any desired roll contour without constant vigilance by the operator. Also turns roll necks by tracer control.

For LOW COST Hole Production

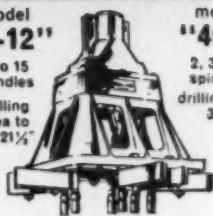
model
"900"
2 to 8 spindles
drilling area
to 22 1/2"



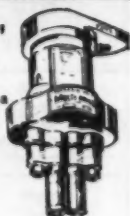
model
"500"
2 to 6 spindles
drilling area
to 18 1/2"



model
"8-12"
2 to 15
spindles
drilling
area to
25 1/4" x 21 1/4"



model
"400"
2, 3 or 4
spindles
drilling area
3 1/2"



model
"3-22"
2 to 15
spindles — drilling area to 35 1/2"

Pick a MULTI-DRILL to Fit the Job

Commander MULTI-DRILLS — adjustable multiple spindle drill press attachments—are sold and serviced by a nation-wide network of Commander Distributors—experienced, helpful specialists in solving drilling and tapping problems. Write for the name of your nearest Distributor and the complete Commander Production Tool Catalog which contains full details on every MULTI-DRILL and many other production drilling and tapping tools.

Commander MFG. CO. 4227 WEST KINZIE STREET
CHICAGO 24, ILLINOIS

Use postpaid card. Circle No. 337

ranges from zero on a 90° shoulder to maximum preset by the operator for a straight diameter. The result is a stepless generation of the contours on the roll. Final finishing or touching-up operations are claimed to be unnecessary.

By switching a lever at the head end, the lathe can be instantly changed from a roll contouring or tracing lathe to a standard engine lathe. The latest American Deluxe Model Pacemaker

lathe is used as the basic machine, with the hydraulic duplicating equipment built in to form a packaged unit.

A new massive tailstock with oversized spindle features a built-in ball bearing revolving center of ample capacity to support the largest and heaviest roll for which each size lathe is recommended.

The American Tool Works Co., Pearl St., Cincinnati 2, Ohio.

Use postpaid card. Circle No. 88

SAVE 50%
or more in
CONTOUR GRINDING
COSTS with
Micromaster



Sold by
**Brown & Sharpe
Mfg. Co.**
Providence,
Rhode Island



Visual Grind is manufactured by
The CLEVELAND GRINDING MACHINE Co.
1670 EDDY ROAD • CLEVELAND 12, OHIO

Use postpaid card. Circle No. 338

Parallel Rubber Rollers Rotate Small Barrels

Almco Roll Barrel deburring and finishing system may be used to process a variety of parts simultaneously. The machine uses an open system of parallel rubber covered rollers powered by a variable speed electric motor. Small barrels with flanges are simply placed on the rollers. Barrel rotation speed is determined by motor speed and size of barrel. Nine barrel sizes are available, and barrel speeds of 17 to 65 rpm are obtained.

Parts and media are loaded and unloaded in a cabinet loaded in a separating cabinet. Barrels are lifted on and off the continuously moving rollers with a built-in hoist



Parts and media are loaded and unloaded in a cabinet placed between the machines.

boom.

Almco, Queen Products Div., King-Seeley Corp., Albert Lea, Minn.

Use postpaid card. Circle No. 90

JAM PROOF

AUTOMATIC THRUST ADJUSTMENT
Spring loaded spindle maintains constant tail stock thrust.

LONGER LIFE
Needle bearing distributes bearing stress over greater surface, thus holding close tolerances for much longer time.

FASTER SPEEDS
Smaller turning radius gives much higher RPM rate than ordinary live centers.



CONCENTRIC LIVE CENTERS

GREATER LOAD CAPACITY

LESS OVERHANG MEANS MORE RIGIDITY... MORE WORKING RANGE

Pat No. 2,520,473

the original, patented spring loaded live centers

Write Today for Complete Information



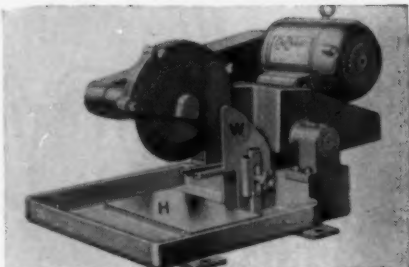
CONCENTRIC TOOL CORP., 2486 Huntington Dr., San Marino, Calif.

Use postpaid card. Circle No. 339

Abrasive Cut-off Machines Built to Suit Needs

A building block program furnishes abrasive cut-off machines to suit the particular operation.

Photo shows the cut-off head with splash pan, splash guard (W) and mounting pad (H) for mounting vise or holding fixture. This head can be furnished with or without the splash pan and mounting pad, depending on user's requirements. A precision vise for



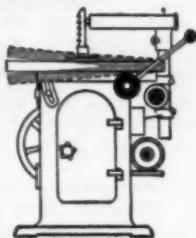
Abrasive cut-off head with splash pan, splash guard (W) and mounting pad (H).

HIGH-SPEED LOW-COST KEYWAYS



WITH DAVIS KEYSEATERS!

You can cut accurate, low-cost internal keyways at *minimum* cost with Davis Keyseaters. Here's why: (1) operation is designed for production *speed*; (2) machine sets up easily, does *not* require skilled operator; (3) maximum concentricity of the keyway in each bore assured; (4) Built in 2 sizes. Keyways range from $\frac{1}{8}$ " to 1". High speed steel cutters stocked in all sizes; (5) the *best* keyseater of its type, yet *inexpensive*! Write now for FREE DETAILED LITERATURE!



Tilting table sets easily for tapered keyways up to 3" per foot.



DAVIS KEYSEATER COMPANY

DIVISION OF *Hansford* MANUFACTURING CORPORATION
1355 G UNIVERSITY AVE., ROCHESTER 7, NEW YORK

Use postpaid card. Circle No. 340

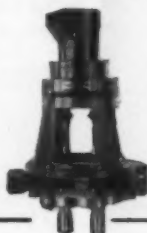
Only



have these exclusive* features

***Standard Full Ball Bearing Construction, including Spindles**

Driving assembly is Full Ball Bearing mounted with 8 Bearings on each spindle. Thrust load carried by radial thrust bearings.



***Standard Slip-On and Slip-Off Template Construction**

For accurate setting and locating spindle brackets are machined to receive slip-on and slip-off template.

4 Standard Models . . . Models U-608 and U-1000—Ball Bearing. Models U-620B and U-1012B—Plain Bearing, 11/16" or 1/2" min. centers. Models U-608-BS and U-1000-BS—Ball Bearing Gear Case, Plain Spindles.

Semi-Standard Heavy Duty Full Ball Bearing . . . 1/2" in Cast Iron—7 1/8" or 9 3/4" dia.

1/2" in Steel—7" or 9 3/8" dia.

Also Larger Adaptations and Full Line of Fixed Center Drill Heads.

WRITE FOR FULL INFORMATION



Also Makers of
BORMAN AUTOMATIC REVERSE TAPPERS
Use postpaid card. Circle No. 381

close tolerance work and air or hydraulic cylinders for automatic control of head are among the features available. The heads are equipped with either 7 1/2 or 10 hp motor and are arranged to use 16" x 3/32" abrasive cut-off wheels.

The Cincinnati Electrical Tool Co.,
359 Mt. Hope Ave., Cincinnati 4, Ohio.
Use postpaid card. Circle No. 91

Presses With Pneumatic Friction Clutch & Brake

A new line of power presses, with pneumatic friction clutch and brake, ranges from 6 to 18 tons in bench or floor models. The high torque, low inertia clutch and brake unit is said to



Sizes 6 to 18 tons, bench or floor models. be self-compensating for wear and never requires any adjustment.

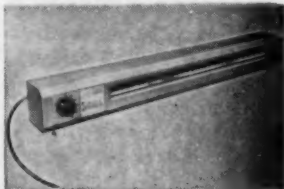
With the air brake, it is possible to do continuous stroking without fear of overheating, the manufacturer claims. The clutch disengagement point (and brake engagement) in the stroke is conveniently adjustable by the operator to provide for varying requirements.

Famco Machine Co., 3100 Sheridan Rd., Kenosha, Wis.

Use postpaid card. Circle No. 92

Portable Rotary White Print Machine Cuts Copy Costs

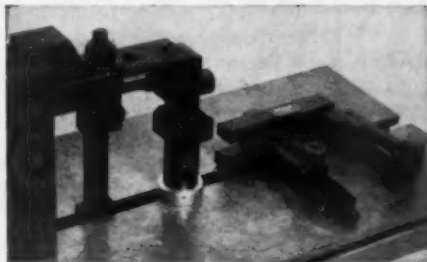
The Satellite portable rotary diazo white print machine measures 44"x5"x5", weighs less than 30 lb, and can be wall-mounted or placed on a small desk or table. It produces white prints of any length and to 30" in width from any translucent original—over 94% of all tracing sizes. Dial with selective speed variations permits exact exposures. Machine reduces reproduction costs as much as 80%. Grico, Inc., Cuyahoga Falls, Ohio.



White prints produced from translucent original.

Use postpaid card. Circle No. 83

COMPARE Hi-Lo CLAMPING WITH YOUR PRESENT METHOD



Buy This
Hi-Lo
STARTER SET
for
\$55

Machine-Tool Clamping System

With the Hi-Lo Clamping System, you can save money, time and labor. This system leads to safe, rigid, parallel clamping on T-slot tables or bolster plates.

The Hi-Lo Starter Set makes one clamp for any tool-room or job-shop setup between $\frac{3}{8}$ and 11". More important, it lets you compare the Hi-Lo System on the same jobs with your present methods. Bolt length and heel-block height are adjustable over the full range of the clamp.

Complete milling machine and boring machine sets are available or you can build up your system to meet your own clamping needs. Full allowance for Starter Set given when purchasing a larger set.

Write for literature and names of distributors.

Hi-Lo PRODUCTS COMPANY

Division of Steel City Testing Machines, Inc.

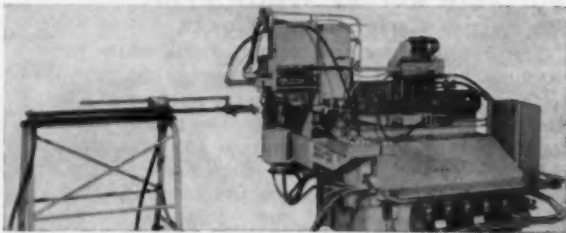
8825 Lyndon Ave.

Detroit 38, Mich.

Use postpaid card. Circle No. 342

Operator Presses a Button—Bender Does the Work

What is claimed to be the first completely automated bending machine is adaptable to a variety of production tube bending jobs. Press the button—and the bender feeds tubes into position, bends them, and removes the bent



First completely automated bending machine

tubing without attendance other than to keep the inlet conveyor of hopper supplying tubes. Two tubes can be processed during each operating cycle of the machine. Simple tooling changes provide versatility in the type of bends: Flat-back "U's" can be produced at the rate of 1800 bends per hour, or conventional return bends at the rate of 980 bends per hour.

From a hopper collector, a special finned elevator picks up programmed tube lengths and indexes them into a

HOLES



DOES JOBS NO DRILL CAN DO

Clark "HOLE MAKER"

P. O. BOX 990 BEVERLY HILLS, CALIF.

Use postpaid card. Circle No. 343



FREE

NEW-16 PAGE
CATALOG

WRITE FOR YOUR COPY TODAY

★

JIG AND FIXTURE COMPONENTS

Latch Bolts	Jig Feet (3 Types)
Cast Iron Hand Knobs	Spherical Washers
Aluminum Hand Knobs	Fixture Keys
Quarter Turn Screws	Knurled Head Screws
Shoulder Screws	Toggle Shoe Clamps & V-Pads

HOLD DOWN AND CLAMPING TOOLS

T-Nut & Stud Sets	Toe Nuts
Stop Block & Clamp Sets	Coupling Nuts
Flanged Nuts	Adjustable Stop Blocks
Cut Thread Studs	Strap Clamps (Plain & Step Type)

CATALOG INCLUDES TRACING TEMPLATES

Northwestern

118 HOLLIER AVE.,
DAYTON 3, OHIO



Use postpaid card. Circle No. 344

pair of vertically stacked loading trays. Sorting fingers fill both trays with tubes and stop the elevator automatically, restarting when the supply of tubes drops to two in each tray.

From the loading trays sequence-controlled hydraulic cylinders select the tubes and reindex them into the bending dies. The clamping dies advance, secure the tubes into the forming dies. Mandrels are next automatically in-

serted into the ends of the clamped tubes to support the tubes during bending.

After bending, the clamps open and a stripper mechanism removes the two tubes from the bending die and drops them onto a conveyor. With the return of the bending arm, one complete cycle is completed.

Wallace Supplies Mfg. Co., 1304 Diversey Pkwy., Chicago 14, Ill.

Use postpaid card. Circle No. 94

MORE IMPRESSIONS PER DOLLAR WITH "GTS" TOOLS



GTS produces Marking Tools of uniform quality.

Your most rigid requirements will be met with every tool which bears the GTS trademark—whether your need is for one tool or for thousands.

From raw stock to final inspection, these tools are produced in our own plant by skilled craftsmen using the most modern facilities.

Hundreds of standard items can be shipped from stock. A complete inventory of alloy steels permits quick delivery on tools made to order.

Use GTS tools and you'll know that there is real economy in buying the best.

**IF IT'S WORTH MAKING,
IT'S WORTH MARKING**

GEO. T. SCHMIDT, INC.



1802 W. BELLE PLAINE AVE.
CHICAGO • 13 • ILLINOIS

Use postpaid card. Circle No. 245

The **HEAVY WEB**

and **FASTER SPIRAL**

of
COGSDILL

MERCURY SERIES

TWIST DRILLS

give you

the

HIGH PRODUCTION

you

NEED and EXPECT

in

TOUGH MATERIALS

Available in Jobbers Length
Taper Length
Straight Shank
Taper Shank

See Your Cogsdill
Distributor



COGSDILL TWIST DRILL CO., INC., Greenfield, Massachusetts

Stocking Warehouses: Detroit, Los Angeles, Greenfield

Cogsdill — the name to remember for quality . . . to watch for progress

Use postpaid card. Circle No. 346



August, 1959

For free information . . . use these postage-free Action Cards

Free Literature circle key numbers

1	11	21	31	41	51	61	71
2	12	22	32	42	52	62	72
3	13	23	33	43	53	63	73
4	14	24	34	44	54	64	74
5	15	25	35	45	55	65	75
6	16	26	36	46	56	66	76
7	17	27	37	47	57	67	77
8	18	28	38	48	58	68	78
9	19	29	39	49	59	69	79
10	20	30	40	50	60	70	80

New Products

circle key numbers

81	93	105	117	129	141	153	165	177	189
82	94	106	118	130	142	154	166	178	190
83	95	107	119	131	143	155	167	179	191
84	96	108	120	132	144	156	168	180	192
85	97	109	121	133	145	157	169	181	193
86	98	110	122	134	146	158	170	182	194
87	99	111	123	135	147	159	171	183	195
88	100	112	124	136	148	160	172	184	196
89	101	113	125	137	149	161	173	185	197
90	102	114	126	138	150	162	174	186	198
91	103	115	127	139	151	163	175	187	199
92	104	116	128	140	152	164	176	188	200

Company

Name Position.....

Street

City Zone..... State.....

Product Mfd.

August, 1959 For free information . . . use these postage-free Action Cards

Advertisements

circle key numbers

201	226	251	276	301	326	351	376	401	426	451	476	501	526	551	576
202	227	252	277	302	327	352	377	402	427	452	477	502	527	552	577
203	228	253	278	303	328	353	378	403	428	453	478	503	528	553	578
204	229	254	279	304	329	354	379	404	429	454	479	504	529	554	579
205	230	255	280	305	330	355	380	405	430	455	480	505	530	555	580
206	231	256	281	306	331	356	381	406	431	456	481	506	531	556	581
207	232	257	282	307	332	357	382	407	432	457	482	507	532	557	582
208	233	258	283	308	333	358	383	408	433	458	483	508	533	558	583
209	234	259	284	309	334	359	384	409	434	459	484	509	534	559	584
210	235	260	285	310	335	360	385	410	435	460	485	510	535	560	585
211	236	261	286	311	336	361	386	411	436	461	486	511	536	561	586
212	237	262	287	312	337	362	387	412	437	462	487	512	537	562	587
213	238	263	288	313	338	363	388	413	438	463	488	513	538	563	588
214	239	264	289	314	339	364	389	414	439	464	489	514	539	564	589
215	240	265	290	315	340	365	390	415	440	465	490	515	540	565	590
216	241	266	291	316	341	366	391	416	441	466	491	516	541	566	591
217	242	267	292	317	342	367	392	417	442	467	492	517	542	567	592
218	243	268	293	318	343	368	393	418	443	468	493	518	543	568	593
219	244	269	294	319	344	369	394	419	444	469	494	519	544	569	594
220	245	270	295	320	345	370	395	420	445	470	495	520	545	570	595
221	246	271	296	321	346	371	396	421	446	471	496	521	546	571	596
222	247	272	297	322	347	372	397	422	447	472	497	522	547	572	597
223	248	273	298	323	348	373	398	423	448	473	498	523	548	573	598
224	249	274	299	324	349	374	399	424	449	474	499	524	549	574	599
225	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600

Inside Front Cover Inside Back Cover Back Cover
 Inserts: 1A 1B 1C 1D 2A 2B 2C 2D 3A 3B 3C 3D

Company

Name Position.....

Street

City Zone..... State.....

Product Mfd.

FIRST CLASS
PERMIT NO. 272
WHEATON, ILLINOIS

BUSINESS REPLY MAIL

No Postage Stamp Necessary If Mailed in the U.S.A.

POSTAGE WILL BE PAID BY

MACHINE and TOOL BLUE BOOK

READERS' SERVICE DIVISION

WHEATON, ILLINOIS

FIRST CLASS
PERMIT NO. 272
WHEATON, ILLINOIS

BUSINESS REPLY MAIL

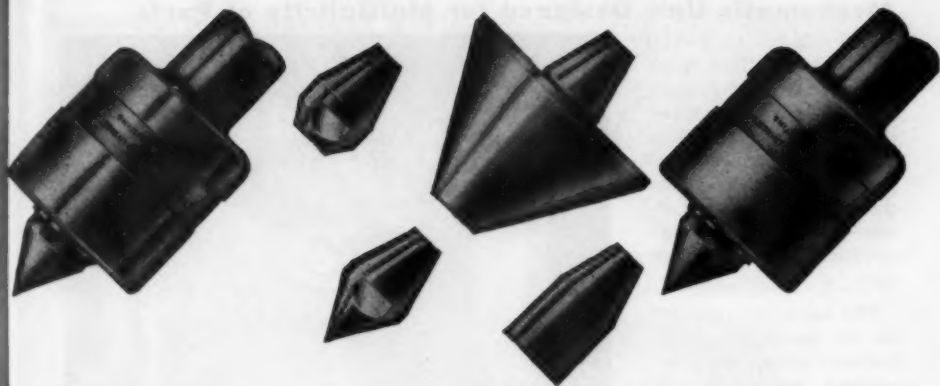
No Postage Stamp Necessary If Mailed in the U.S.A.

POSTAGE WILL BE PAID BY

MACHINE and TOOL BLUE BOOK

READERS' SERVICE DIVISION

WHEATON, ILLINOIS



Famous Perfection
Grinding Live Center

H.S.S. and Carbide
Accurate Detachable Points

Expansion Compensating
Lathe Centers

ANNOUNCING THE FIRST COMPLETE LINE OF PRECISION-BUILT LIVE CENTERS

INCLUDING 5 TYPES OF
EXPANSION COMPENSATING CENTERS

- the only complete line
- the only guaranteed self-adjusting live center

INTRODUCING J & S Tool Company's complete new line of live centers with accuracy better than .0001", with these features:

- Guaranteed one year.
- Self-adjusting bearing take-up.
- RPM speeds up to capacity of present-day machines.
- Correct capacity rating.
- Hardened and ground throughout.

Write today for a free copy of the J & S Live Center Catalog.

J & S TOOL CO., INC.

880 Dorsa Avenue
LIVINGSTON, NEW JERSEY

J & S TOOL CO., INC., ALSO MANUFACTURERS FLUIDMOTION WHEEL DRESSERS
CLAMPS • NO-BEND MILLING ARBORS AND CLAMPCUT MILLING VISES

Use postpaid card. Circle No. 347

Mechamatic Unit Designed for Multiplicity of Parts

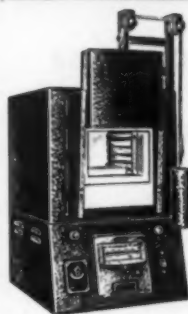
The MM-1-2-HS (high speed) dual spindle unit, which has been designed for the fixtured deburring and finishing of a multiplicity of parts, handles low production of many different parts and/or high production of a single part.

The parts are mounted on air operated spindle fixtures which are submerged, while rotating, in a fluid abrasive mess which simulates a form fitting grinding wheel traveling at the rate of approximately 2000 sfm. The Mechamatic process is completely automatic and controlled except for



This machine produces 240 pieces per hour per spindle at 15-second time cycle; capacity is up to 8 1/4" dia. part.

loading and unloading the parts.
Mecha Finish Corp., Sturgis, Mich.
Use postpaid card. Circle No. 95



Request literature on complete line of Huppert furnaces and ovens.

* For 2300° F. add \$95.00 to No. 11 and No. 12, and \$105.00 to No. 12A. No. 12A can be furnished for 3 phase at no additional cost. For floor model add \$52.00 to above prices. No. 869 standardly supplied for 2200° F.

Be sure of Maximum Heat Treating Efficiency with **HUPPERT FURNACES**

- Range: 300° F. to 2000° F.
- High temperature, heavy-duty Kanthal elements
- Multi-insulation
- Counter-weighted, tight-sealing door
- Operational pilot light
- Shipped ready to operate

Model No.	Inside Dimensions			KW	Prices 220 Volt Single Phase	
	Wide	High	Deep		With Huppert Input Controller	With Electronic Temp. Controller
869	8"	6"	9"	4	\$296.00	\$480.00
11*	8"	6"	12"	4	306.00	518.00
12*	8"	8"	12"	6	382.00	590.00
12A*	8"	8"	18"	9	490.00	698.00

K. H. HUPPERT CO.

Manufacturers of Electric Furnaces and Ovens

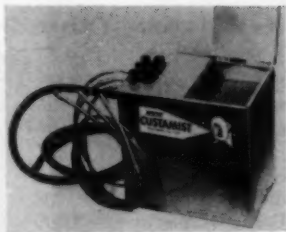
6845 Cottage Grove Ave., Chicago 37, Illinois

Use postpaid card. Circle No. 348

Portable Mist Coolant System

The Custamist portable Fine-Fog system is available in one, two, three, and four outlet units with two gallon tank. Features: separate valve controls for air and lubricant; special armored outlet line covering; adjustable flexible nozzle ends; special hooded spray tip; heavy duty steel tank; hinged tank cover; baked enamel finish. Custanite Corp., 1228 Utica Ave., Brooklyn 3, N.Y.

Use postpaid card. Circle No. 56



1, 2, 3, and 4 outlet units.



For Approximately \$50 You Get 12 Sets, Each Set Ground Ready To Go

Men would not accept

EITHER IDEA AT FIRST

INSERT CHASERS SAVE UP TO 33%

Insert chasers are like safety razor blades: they cost so little that you can throw them away when dull. Or, for utmost economy, you can resharpen them over and over again. Only a flash grind is required. For approximately \$50 you get a dozen sets of $\frac{1}{16}$ —16 insert chasers, each set ground ready to go. You will be amazed at the quantity of threads they will cut, even to Class 3 specifications, with a minimum of downtime. FREE: "Unified and American Screw Thread Digest"

EASTERN MACHINE SCREW CORPORATION

25-45 Barclay Street, New Haven, Conn.

Use postpaid card. Circle No. 349

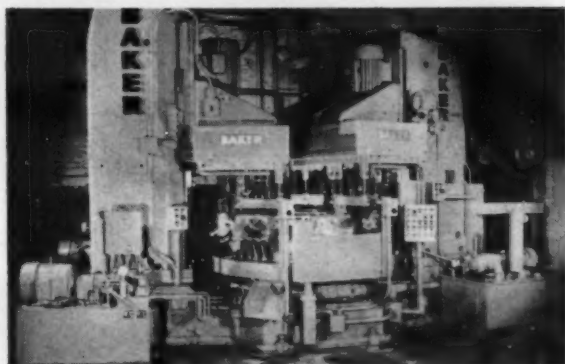
New Index Table Serves Team of Drilling Machines

Made completely of standard units, this vertical index or dial machine processes automotive connecting rod pin holes. The machine was designed and built by Baker Brothers, Inc., Toledo, Ohio.

Cycle: Load four parts per fixture; drill to one-half depth; drill through; ream and chamfer. Production rate is 600 parts per hour gross.

The new hydraulic index table permits removal of all components from the outside, without disturbing the fixtures or the index table top.

Use postpaid card. Circle No. 97



Combined A-24-VF and A-18-VF fixed center drilling machines installed with new hydraulic index table.

Boyar-Schultz COPPER HEAD LAPS

(STANDARD AND EXPANSION)

It is less costly and quicker to use Boyar-Schultz Copper Head Laps, than to make your own. Copper Head Laps are accurate and rapid to use. Nothing to wear out but the copper sleeve which is replaceable and adjustable to the correct size. Adjustment permits maintaining lapping size till worn out and replaced with new ones. Available from stock in standard sizes, $\frac{1}{8}$ " to $2\frac{1}{2}$ " diameters.

SPECIAL TOOL MAKERS BENCH LAP SET

Consists of seven most commonly used sizes — $\frac{1}{8}$ " - $\frac{3}{16}$ " - $\frac{1}{4}$ " - $\frac{5}{16}$ " - $\frac{3}{8}$ " - $\frac{7}{16}$ " - $\frac{1}{2}$ ", with enameled die cast base.

BOYAR-SCHULTZ CORPORATION

2008 So. 25th Ave.

Broadview, Ill.

Use postpaid card. Circle No. 350



BALANCED ALLOY LEAD HAMMERS



HANDLES AND MOULDS

1, $1\frac{1}{2}$, $2\frac{1}{2}$ and 3 lb. sizes—order your alloy lead hammer requirements from your mill supply house or direct from:

KITZMAN MFG. CO.

Manufacturers Of Lead Hammer Products
15061 Hartwell Ave. Detroit 27, Mich.

Use postpaid card. Circle No. 411

NOW A FASTER READING DIAL CALIPER



- Newly designed for faster, accurate measurement.
- Engraved beam graduations simplify reading.
- Double jaws permit easy inside, outside and depth measurements—can be locked in position • All operating components are completely enclosed.
- Precision built from stainless steel and brass.
- Two models—6" at \$39.00. 8" at \$42.00. • Write Today for Free Literature.

Dealer Inquiries are Invited

TITAN TOOL SUPPLY CO., INC.
Box T. 1419 Hertel Avenue Buffalo 16, N.Y.

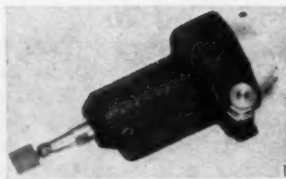
Use postpaid card. Circle No. 351

75,000 RPM Hand Grinder

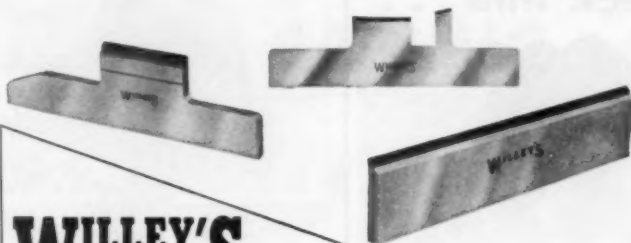
A new M-F air jet hand grinder has a speed of 75,000 rpm, insuring smooth operation, better work, less wheel wear, the manufacturer claims. The tool features a convenient push button stop brake and a speed regulator for rotary files and burrs. Specs.: operating air pressure, 70 to 100 lb; max wheel diameter, 0 to 7/8"; chuck opening, 1/8".

M-F Engineering, Blue Island, Ill.

Use postpaid card. Circle No. 98



Tool has a push button stop brake and a speed regulator for rotary files.



WILLEY'S CARBIDE WORK SUPPORT BLADES FOR CENTERLESS GRINDERS

FROM STOCK standards & specials

Thru-Feed • In-Feed • Long-Bar
Tube & Rod • Roller In-Feed
Race • Power Race
Heavy Duty

WORK SUPPORT BLADES

for special applications

Many centerless grinding operations require special carbide tipped work support blades for work such as: multi-diameter—angular—form—tapered or radius grinding. For more than 20 years Willey's have manufactured these blades to meet specific job applications.

RECONDITIONING SERVICE Willey's regrind or carbide re-tip your worn out, chipped, broken or damaged work support blades to original accuracy... smooth—straight and parallel... a service and savings available to you too!

Write for complete
illustrated catalog
and price list



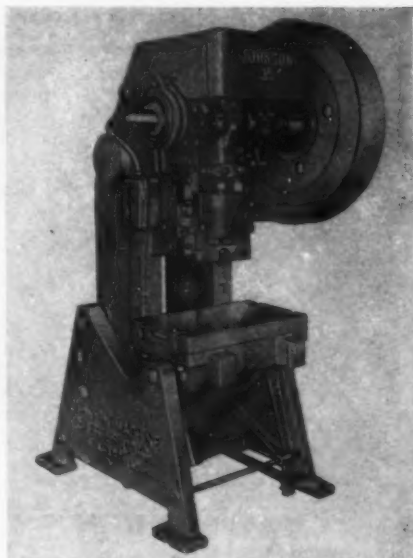
WILLEY'S CARBIDE TOOL COMPANY

1340 WEST VERNOR HIGHWAY • DETROIT 1, MICHIGAN
WOodward 1-9444

Use postpaid card. Circle No. 352

Flywheel Or Back Geared O.B.I. Press

The "box top" of the 35 ton O.B.I. press is an integral part of the main frame casting which greatly supports the crankshaft bearings and reduces harmful deflection. The model is available in the conventional flywheel or back geared styles, and comes equipped



Crank strokes from 2½" to 6".

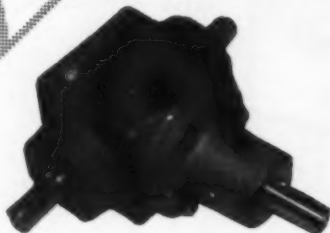
with either the Johnson pin clutch or the Wichita air friction clutch.

As with all other Johnson cast presses, the main bearing caps are split on a 30° angle which allows the massive frame to absorb the shock load. Crank strokes range from the standard 2½" up to 6".

Johnson Machine & Press Corp., Elkhart, Ind.

Use postpaid card. Circle No. 99

Check this . . .



MITER GEAR UNIT ATTRACTIVELY PRICED

- ✓ Precision Workmanship.
- ✓ Timken Tapered Roller Bearings.
- ✓ Neat - Compact - yet Rugged.
- ✓ High Tensile Steel Shaft.
- ✓ Ratios 1:1, 1:1½, 1½:1, 1:2 & 2:1
- ✓ Dependable & Trouble Free
(10 years proven experience)
- ✓ Universally Adaptable.

WRITE FOR LITERATURE AND
PRICE INFORMATION.

EMCH TOOL & ENG. CO.
ALBERT CITY IOWA

Use postpaid card. Circle No. 436

Plain Type

CLOSED
TRADE

AUTOM

CLOSED
MARK

Offset Type

CONTINUOUS HINGES

All hinges shown can be furnished with special holes, cutouts and bends to blue-print in metals to suit the job.

THREE-FOURTHS
OFFSET

**AUTO MOULDING
& MFG. CO.**

**1110 E. 87TH ST.
CHICAGO 19, ILL.**

Use postpaid card. Circle No. 353

SPECIFICATIONS
Open width 7½" to 6"
Gage Material .040 to .125
Pin Diameter .101 to ⅜
Lengths to 120"

SEMI-OFFSET

Drill Unit Has Built-in Feed

A new low-priced automatic drilling unit, the Govro-Nelson Model KHB, includes its own built-in feed so that shop air is not required. This eliminates installation expenses involved in air controls and plumbing, as well as maintenance cost of air equipment. An infinitely variable hydraulic rate of feed control has adjustable rapid approach to control the tool at entry and at break-through.

Govro-Nelson Co., Detroit 8, Mich.

Use postpaid card. Circle No. 100



Shop air is not required.

FRICITION SAWING with...

Tannewitz

HIGH SPEED BAND SAWS

SOLVES THOUSANDS OF PROBLEMS!

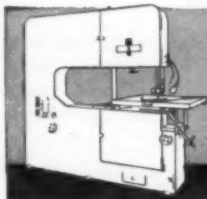
FOR EXAMPLE: cutting side panels of a barometric damper as shown above. Cost of dies required for seven sizes would have approximated \$12,000—a prohibitive sum for volume required on these sizes. Friction-sawn on a TANNEWITZ High Speed Band Saw in multiples of two in 1.2 minutes each—a very moderate cost which makes feasible the complete line required. Cost of machine was only a small fraction of cost of dies contemplated and it is also available for many other uses.



For trimming castings, formed parts, cutting metal as hard as a file and dozens of other operations, too, friction sawing with TANNEWITZ High Speed Band Saws offers tremendous advantages. Write for free booklet, "FRICITION SAWING."

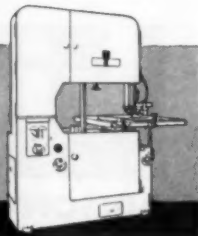


THE TANNEWITZ WORKS • GL 6-1729
GRAND RAPIDS, MICHIGAN



TANNEWITZ DIE-SAWS
24", 36", 48", 60" CAPACITIES
for CONTOUR SAWING, FILING, POLISHING
The smoothest, fastest, most trouble-free Die
Saws on the market. Write for bulletin.

SAWING MACHINERY SPECIALISTS



Use postpaid card. Circle No. 354

**FEATHERWEIGHT
AIR GRINDING**

kipp

AIR GRINDERS

MODEL JA
50,000 R.P.M.

\$60.00

IN U.S.A.



Weight 12 ounces;
length 6 1/4 inches;
chuck size 1/4 inch.
Wheel guard removed
for better illustration.

THE SPEED of Kipp Featherweight Air Grinders stays up where it belongs, under load, for efficient grinding even with small wheels. This may not be true with most of the "Plug-In" grinders you now are using.

HAVE YOU GIVEN your tool-makers a chance to save valuable hours by providing them with enough Kipp Featherweight Air Grinders and accessories?

kipp

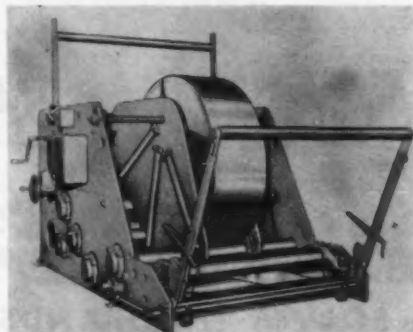
MADISON-KIPP CORP.

207 Woubesa St., Madison 10, Wis., U.S.A.

Use postpaid card. Circle No. 355

Coil Cradles Improved

New design features in Benchmaster's heavy duty Series 700 "Koil Kradles" add greater operating convenience, increase strength and rigidity of frame, and improve efficiency. Greater width capacity has been obtained between guide plates, yet over-all outside dimensions have been reduced. Side plates



Tubular construction makes frame rigid.

are now joined in a rigid, welded structure employing heavy wall tubes as transverse members. This eliminates racking and torsional deflection of the frame, retaining alignment of bearings in which rolls are mounted.

Each guide plate is now supported by four lead screws located in a trapezoidal pattern to prevent side deflections of the plates when guiding heavy coils. All lead screws are linked by a chain drive engaging sprockets. A single hand crank on each side simultaneously rotates lead screws for lateral spacing of central guide plates to accommodate any coil width within the capacity of the unit.

Pinch rolls are furnished as standard equipment in the 700 series. These coil cradles are available in a range of coil weights up to 20,000 lb., widths to 50".

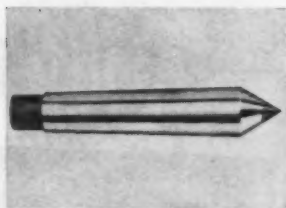
Benchmaster Mfg. Co., Gardena, Calif.

Use postpaid card. Circle No. 101

Carbide Centers and Half Centers

Benco carbide centers and half centers for lathes and grinders are available in Morse, Brown & Sharpe, and Jarno tapers. Alloy steel body with Rockwell "C" hardness of 60 is ground to a mirror finish. Extra long carbide inserts permit innumerable regrindings and precision lapped carbide point. Benco Collet Mfg. Co., Cleveland.

Use postpaid card. Circle No. 102



Choice of Morse, Brown & Sharpe, and Jarno tapers.

Modernair

ECONOMAIR CYLINDERS

Tops in Quality, Economy, Compactness!



For Air or Hydraulic Service to 200 psi

- ★ Compact—feed ring head design eliminates bulky end castings!
- ★ Interchangeable mountings—flange, clevis, L-type
- ★ "O" ring seals throughout
- ★ Available in 1¼", 1½", 2", 3" and 4" bore sizes, any practical stroke length, cushion or non cushion types

Economair series cylinders offer today's best buy in quality cylinders at truly competitive prices—why pay more and get less? Write today for complete specifications, prices.

Modernair CORPORATION

Dept. N8, 400 Preda St., San Leandro, Calif.
5007 Brookpark Rd., Cleveland 34, Ohio

Use postpaid card. Circle No. 356



Now! HEAT TREATED...

So popular with users.

COLLIS Heat Treated Sleeves and Sockets are manufactured by skilled workmen to give long durable service and extra long life. This type of sleeve has less chance of nicks and assures some accuracy with longer runs.

Call at once for our representative to explain about the Complete Collis Line of Lathe centers, Arbors, Drill Drifts, and Magic Type Chucks as well as Sleeves and Sockets and Collets.

"Call Collis for Service"

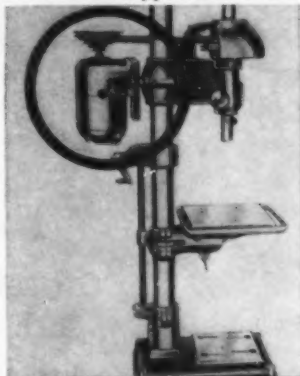
THE COLLIS CO.

DEPT. A, CLINTON, IOWA

Use postpaid card. Circle No. 357

Use of Gearshift Drives On Drill Press Application

The use of a four-speed Lima gearshift drive in place of the standard motor gives the effect of having four different motors applied to the equip-



ment, which, when combined with the five-step cone pulley, provides up to twenty spind'e speeds. This is the result claimed by the manufacturer from a recent study involving the use of his "selective-speed" gearshift drives on drill presses. The drill press is then adaptable for spot facing, chamfering, counterboring, and tapping operations.

The integral motor of the four-speed drives has input speeds of 1730, 1140 or 865 rpm to the selective speed transmission.

The Lima Electric Motor Co., Inc., Dept. 140, Lima, Ohio.

Use postpaid card. Circle No. 103



DYKEM STEEL BLUE

Steps Losses

making Dies and
Templates

Popular package
8-oz. can fitted
with Bakelite cap
holding soft-hair
brush for applying right
at bench; metal surface
ready for layout in a few min-
utes. The dark blue background
makes the scribed lines show up in
sharp relief, prevents metal glare.
Increases efficiency and accuracy.

Write for sample on company letterhead
THE DYKEM COMPANY
2301G North 11th St. • St. Louis 6, Mo.

Use postpaid card. Circle No. 358

Multi-Speed Drill Motor

Governor setting of this $\frac{1}{4}$ " pneumatic drill is readily adjustable from outside the tool. Speed may be set from 750 to 3500 rpm. Drill covers field from stainless to aluminum. Air consumption is proportional to the load. Full torque is available at any speed for which the tool is set.

D-K Products, Inc., S. Gerhart, Los Angeles.

Use postpaid card. Circle No. 104



Available in $\frac{1}{4}$ "- $\frac{1}{2}$ " capacity, various torque ratings

LW DIVIDING HEADS

*Accurate,
Heavy
Duty*



Ball bearing thrust on worm shaft and rear end of spindle. Headstock spindle has threaded nose. Large tapered bearing adjustable for end play. Head tilts past 90° . Worm wheel and alloy-stress-proof steel worm cut to close limits for accuracy. Worm wheel and worm shaft can be fully disengaged. Complete with three index plates for dividing all numbers to 50 and even numbers to 100 except 96T. Index chart shows all divisions obtainable to 380. Right or left hand models.

MODEL SD (Shown above). $6\frac{1}{2}$ " Swing. Spindle threaded $1\frac{1}{2}$ "-8. $9/16$ " table slot tongues. 36 lbs.

\$175⁰⁰

MODEL BP. 11" Swing for plain milling machine. Spindle threaded $2\frac{1}{4}$ "-10. $\frac{3}{8}$ " table slot tongues. 140 lbs.

\$295⁰⁰

MODEL AU. 11" Swing. Fully universal for complete indexing and spiral cutting. Spindle threaded $2\frac{1}{4}$ "-10. $\frac{3}{8}$ " table slot tongues. 190 lbs.

\$460⁰⁰

See your dealer or order direct, giving dealer's name.

Send for complete catalog giving prices and specifications on these quality, low-cost L-W Products



L-W CHUCK COMPANY 2350 ST. CLAIR ST. TOLEDO 4 OHIO

Use postpaid card. Circle No. 359

True Conical Grinding on a STERLING Drill Grinder gives you Faster Cutting Drills and More Holes per grind

Conical grinding of a drill point produces the same clearance angle from O.D. to web. The drill enters the work easier, cuts a uniform chip that requires less pressure, less power.



STERLING "DV"

\$590⁰⁰

F.O.B. Eau Claire, Wis.

CAPACITY

90°—140° Included angle, variable clearance angle set with built-in gage. Grinds $\frac{1}{8}$ " to 2 $\frac{1}{2}$ " drills; 2, 3 & 4 flutes.

Set-up is simple and fast because no chucks or collets are used. Built-in diamond wheel dresser produces a finished cutting edge that stands up longer. You get more, accurate holes with drills ground on a STERLING "DV".

Ask your STERLING Dealer for complete information on all STERLING Drill Grinders or write direct

McDONOUGH
MANUFACTURING CO.

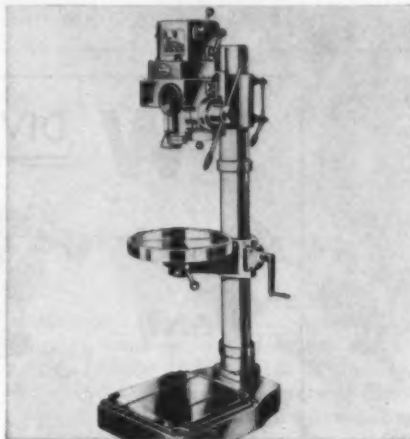
1520 GALLOWAY • EAU CLAIRE, WISC.

Use postpaid card. Circle No. 360

212

Gear Driven Drill Presses

Medium-capacity drill presses with gear drive are now being built in Sweden for Boice-Crane distribution in the United States. The line includes 1" and 1 $\frac{1}{4}$ " capacity hand feed models in the 18" and 24" classes respectively, plus a power feed model in the 24" class.



Powerful all-gear drive eliminates tight belts, cumbersome pulleys and guards, maintains high torque at lower speeds to permit drilling larger holes and the use of larger multiple spindle attachments—and provides a more compact head.

Speed selection on the four speed model is by gear shift, and on the eight speed model by the additional use of the built-in two speed, three phase motor, which permits instant two to one speed changing. Provision for tapping by means of a hand switch to reverse direction is standard on 24" and optional on 18" models.

A super-sensitive triple-action automatic depth stop provides up to three stops for hand-feed step drilling and interrupted stroke drilling and counter-boring.

Boice-Crane Co., 936 W. Central Ave., Toledo 6, Ohio.

Use postpaid card. Circle No. 105

MACHINE and TOOL BLUE BOOK

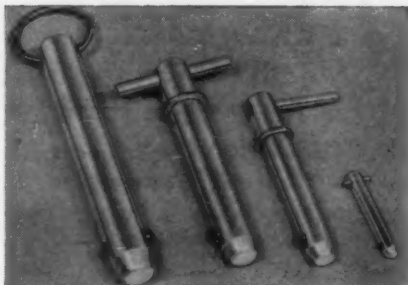
Quick Release Detent Pins

New series of "Faspin" quick release detent pins is specially designed for fastening assemblies or mechanical units that are to be disassembled frequently. The pins can be withdrawn immediately for emergency release.

They are available with T or L type handles or grip rings as illustrated—in a wide range of sizes, from 3/10" to 12" long and 3/16" to 1" in diameter.

Aerofast, P. O. Box 324, Wheaton, Ill.

Use postpaid card. Circle No. 106



Fasten units that are to be dismantled.

The WELLS Model 600 Metal Cutting Band Saw

for
Tool and
Stock Room
Service

•
for
Medium
Production
Jobs



Wet Cutting
System Optional

Rugged in design, dependable in operation, the Wells Model 600 is the ideal saw for tool and stock rooms . . . gives excellent service on medium production jobs. Uses 5/8" blade. Adjustable, uniform gravity feed is provided by hydraulic stabilizer and special coil spring. Casters available for portability. Write for Bulletin 260-A.

WELLS

Wells

The Pioneers of Horizontal

**METAL CUTTING
BAND SAWS**

WELLS MANUFACTURING CORPORATION

707 Coolidge Ave., Three Rivers, Michigan

Use postpaid card. Circle No. 361

THE BEST PORTABLE ELEVATING TABLE YOU CAN BUY . . . (Eliminates Cranking)



2000 LBS. OR *1000 LBS. CAPACITIES
*ILLUSTRATED

**A precision made
MIDWEST TABLE
Costs no more!**

- ✓ It's hydraulic . . . positions work or feeds at desired height without use of hands
- ✓ Rigid cast construction
- ✓ Top turns 360° and clamps
- ✓ Foot release valve to lower
- ✓ Machined top surface can be used as work table
- ✓ Roller bearing casters with ball bearing swivels
- ✓ Floor clamping available extra

Write today . . . specials on request

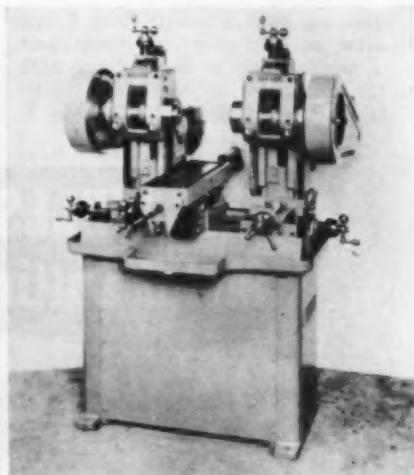
MIDWEST
ENGINEERING COMPANY

112 WEBSTER ST., DAYTON 2, OHIO
Use postpaid card. Circle No. 366

214

Dual-Head Milling Machine Doubles Parts Operations

The Barker A.M. dual-head milling machine was designed to handle a wide variety of operations. Milling operations



Handling of material can be reduced 50%

on parts can be increased as much as 100%, while at the same time the handling of material by the operator can be reduced as much as 50%, the manufacturer claims.

Seven movements can be operated air-hydraulically. The travels are as follows: The columns can be brought together so that there is a minimum distance of 2¾" and separated to a maximum distance of 11" between the two spindle faces. The columns can be moved from front to rear together or independently a distance of 3¼". Each head can be raised a minimum of 2" and a maximum of 8" from the top of the table, which is 20" long, 6" wide, with a 10" travel.

Barker Engineering Co., 500 Green Rd., Cleveland 21, Ohio.

Use postpaid card. Circle No. 107

MACHINE and TOOL BLUE BOOK

Multi-Purpose Cutting Tool

The Draco Speed Shear is a new multi-purpose cutting tool developed by German engineers. It is available in two models, one especially designed for the speed cutting of light metal up to $\frac{1}{8}$ " and sheet iron up to $\frac{3}{64}$ " thickness, the other for cutting plastics, linoleum, leather, rubber, cardboard, asbestos and all other types of fibrous materials. Attached in a few seconds to any make of electric hand drill or motive power unit which transmits

through a chuck, including flexible drives and high-speed drilling machines.

The tool will cut any shape of pattern, including tubular work, without distortion or straightening. No edge finishing is required. A curved or straight pattern can be started in the middle of the sheet; only a $\frac{3}{8}$ " hole is necessary to insert the cutting blade.

Malden Research & Development Co.,
1130 Main St., Malden, Mass.

Use postpaid card. Circle No. 108



real detergency

Stuart's new

Hi-D

transparent metalworking compound



New highly detergent compound keeps grinding wheels open and free cutting, yet does not make them act too hard. Petrochemical base protects as it cools, does not attack paint or way lubricant. Used at 60:1 dilution for grinding and 40:1 for cutting.

D. A. STUART OIL CO., LIMITED

2727 South Troy Street, Chicago 23, Illinois
Canadian D. A. Stuart Oil Co., Limited, P. O. Box 430,
43 Upton Road, Scarborough, Ontario, Canada

Water Mix Cutting Fluids: Hi-D • Codol • Solvol • Dasco Super Soluble

Use postpaid card. Circle No 362

KEO

COMBINED DRILLS and COUNTERSINKS

• Both old and new series carried in stock for immediate delivery. Finest high speed steel. Ground spiral flutes. New standard simplifies and improves size progression. New comparison chart mailed on request. Shows new standard sizes—both plain and bell type. Specials to your blue prints. We also stock Keyseat Cutters, Arbor Type Cutters, Center Reamers, Lath Mandrels, T-Slot Cutters and Long Series Combined Drills.

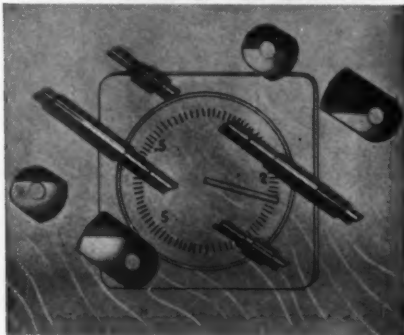
KEO CUTTERS, INC.

25840 Easy St., Warren, Mich.
Warehouse: 1300 S. Soto St.,
Los Angeles 23, Cal.

Use postpaid card. Circle No. 363

20 TO 200 D.P.

SEND YOUR PRINTS FOR QUOTATION



SPURS • HELICALS • WORM AND WORM GEARS
STRAIGHT BEVELS • LEAD SCREWS • RATCHETS
CLUSTER GEARS • RACKS • INTERNALS • ODD SHAPES

THE Finest IN GEARS



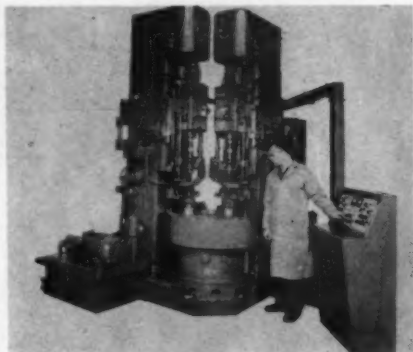
1033 PARMELE ST. ROCKFORD, ILLINOIS

Use postpaid card. Circle No. 364

216

Special Honing Machine

Motor rotors are honed at the rate of 200 parts per hour on this Barnes-driL special two-station production honing machine. The rotors are constructed of laminated steel and vary from three to four inches in length in different lots. Required bore size in all the parts remains constant at .8750"-.8755" with a surface finish of 25 rms. The tooling designed for this honing job is producing bores better than .0002" of size on diameter from



Two honing machines are arranged with electronic hone expansion, Plugmatic sizing, and 2-station rotary index table.



"We had to do a little doubling up, sir, but as soon as there is a room available at the hospital we'll have you out of this dog and cat clinic."

MACHINE and TOOL BLUE BOOK

bore to bore while removing .003" stock.

Two standard Barnesdril Model 223 vertical type honing machines are mounted on a common base with a two-station 180° rotary index table equipped with four fixtures.

The two honing units operate independently or simultaneously as the job requires. Changing the stroke on one unit to accommodate parts of a different length does not interfere

with the operation of the second unit.

Both units are equipped with electronic hone expansion and Plugmatic automatic bore to bore sizing units. The hydraulically operated rotary index type table rotates 180° in each direction against positive stops to assure positioning of the parts at each honing station.

Barnes Drill Co., 852 Chestnut St., Rockford, Ill.

Use postpaid card. Circle No. 109

IMPORTANT NEW "TOOL"

for Surface
Inspection
and
Control

The MICROCORDER

The Microcorder draws magnified surface roughness profiles that show (1) *peak-to-peak spacing* and *peak-to-valley height* of roughness irregularities and (2) *width and depth* of pits, scratches, chatter marks and surface porosity. It is simple to operate, and is designed for use in shop or lab — on metals, paper, plastics, etc. — for any length of trace up to 2¾" on ID's, OD's and flats.

FREE BULLETIN LT138 gives specs. Write —

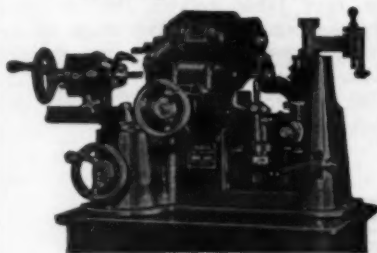


MICROMETRICAL
MANUFACTURING COMPANY

345 S. MAIN ST., ANN ARBOR 4, MICHIGAN
Use postpaid card. Circle No. 365

HYBCO TAP GRINDER

Sharpens Chamfers, Flutes
and Spiral Points



Model 1100

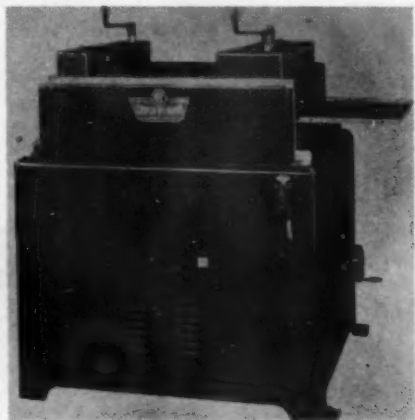
- Capacities No. 0 Machine Screw to
2½" Hand Taps

HENRY P. BOGGIS & CO.
710 E. 163rd St. Cleveland 10, Ohio

Use postpaid card. Circle No. 367

Parts Straightener Reduces Hand Fitting

The Cooper Weymouth 20" parts
straightener is designed to reduce hand



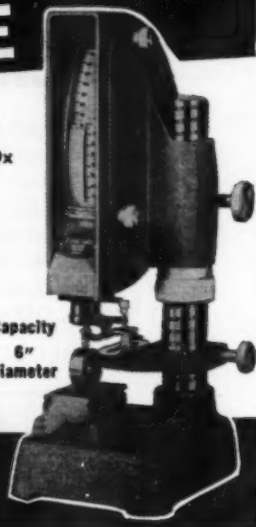
Flat stampings, coil, strip to 20" wide.

Leitz TOLERATOR THE TRU-VISION COMPARATOR GAGE

- Positive action through low-ratio initial amplification of 4:1
- Additional optical amplification of 250:1 = total of 1000x
- Rapid quantity gaging between adjustable colored tolerance masks
- Selective inspection from long range illuminated scale with 100 divisions
- Direct effortless reading in .00005"
- Variety of interchangeable anvils and contact tips
- Instrument also available for internal gaging

Request 8-page catalog 82-177

Capacity
6"
Diameter



OPTO-METRIC TOOLS, INC.

137 BB VARICK STREET, NEW YORK 13, N. Y.

Use postpaid card. Circle No. 368

fitting in assembling products, provide improved performance for functional parts, and better appearance for painted or plated items.

Accommodating flat stampings as well as coil and strip up to 20" wide, the straightener will smooth and flatten to within .001"- .002" at feed rates from 10 to 50 ft/min. Design and construction features include a two-point adjustment for fast, precise setup and

changeover, and four separate gear trains to drive all rolls, equalize drive and bearing loads, and provide smooth, high-speed operation.

Straighteners are available in self-contained, bench-height cabinet and portable models, with flat or angle heads, variable speed drive and reverse switch.

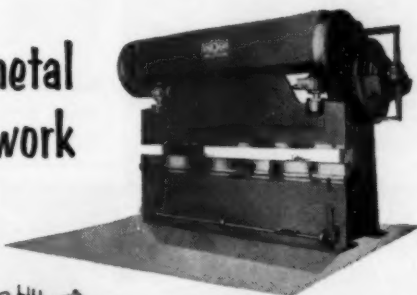
Cooper Weymouth, Inc., 603 Honey-spot Rd., Stratford, Conn.

Use postpaid card. Circle No. 110

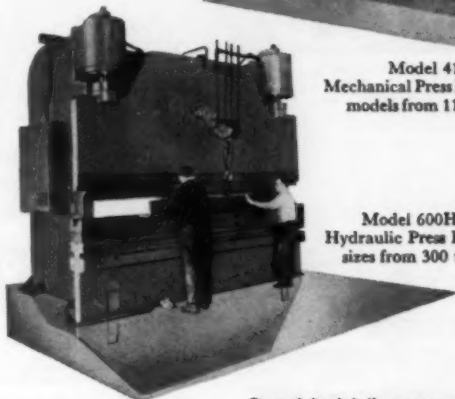
CHICAGO® PRESS BRAKES

UNEXCELLED ACCURACY

for sheet metal
and plate work



Model 410D, 90-Ton CHICAGO Mechanical Press Brake. Other standard models from 11 to 450 ton capacities.



Model 600H10, 600-Ton CHICAGO Hydraulic Press Brake. Other standard sizes from 300 to 2000 ton capacities.

9489

*Complete details or recommendations
on any press brake work upon request*

Press Brakes
Press Brake Dies
Straight-Side-Type Presses
Hand and Power Bending Brakes
Special Forming Machines



DREIS & KRUMP
MANUFACTURING CO.

7440 S. Loomis Blvd., Chicago 36, Illinois

Use postpaid card. Circle No. 369

Stainless Steel Filter For 750 PSIG Pressure

The Commercial SS75C Fulflo filter, made with a durable one-piece shell of Type 316L stainless steel, is designed for operating pressures up to 750 psig. It is recommended for all operations requiring minimum chemical reaction between the filter and liquid or gas being filtered. Applications include



Applications include compressed air, gases, hydraulic fluids, liquid fuels, liquid chemicals, lubricating oils, and water.

DANNEMAN Precision DIE SETS



Catalog
on request!

DANNEMAN DIE SET DIVISION
Acme-Danneman Company, Inc.
203 Lafayette St., New York 12 • AL 5-7150
Use postpaid card. Circle No 370

SUPER COMPARATOR Gaging Head by Mahr

Reading in 20 MILLIONTHS of an inch

ACCURACY over entire range ± 10 MILLIONTHS
RANGE of dial $\pm .001"$
SPACE between graduation lines .0354"

... with these SPECIAL ADVANTAGES

- CONSTANT MEASURING PRESSURE and practically frictionless movements of all parts
- EXTREME MEASURING ACCURACY and MAXIMUM SENSITIVITY
- SHOCKPROOF MOVEMENT fully JEWELLED
- FINE ADJUSTMENT over entire dial range
- CABLE RELEASE for lifting of feeler point
- SAPPHIRE TIPPED contact point

Stands and
Brackets
available



GUARANTEED Mahr QUALITY

OTHER COMPARATORS
with
.000050" and .0005"
Graduations

IF NOT AVAILABLE AT YOUR FAVORITE SUPPLY HOUSE,
WRITE TO US FOR ILLUSTRATED FOLDER

MAHR GAGE CO., INC.

274-MA LAFAYETTE ST. • NEW YORK 12, N.Y.

Use postpaid card. Circle No. 371



NON-GLARING
Dial and
hair thin
Pointer

Adjustable
Tolerance
Hands

Instant
Fine
Adjustment

PRICE
\$59.50
with plastic case

Fully jewelled
shockproof movement

Small in size for
limited working space

Overall dimensions
3-3/4" x 2-1/2" x 3/4" thick

HEADQUARTERS FOR
PRECISION MEASURING
INSTRUMENTS
AND FINE TOOLS

compressed air, gases, hydraulic fluids, liquid fuels, liquid chemicals, lubricating oils, and water.

The filter employs a 10-inch honeycomb filter tube, manufactured in a wide range of densities to provide any degree of continuous microclarity, down to 1 micron. Tubes are available in cotton, nylon, orlon, dynel, acetate or glass fibres. Cores are of plain steel, No. 316 stainless steel, tinned steel, copper, tinned copper, nickel, PVC, or

phenolic-impregnated paper.

Maximum air flow rate is 650 scfm at 750 psig operating pressure with initial pressure loss of 3 psi. Flow rates for liquids varies according to nature of fluid and operating conditions, with maximum of 5 gpm for liquids of aqueous viscosity. Straight-line pipe connections (dry seal thread) have standard $\frac{3}{4}$ " nptf.

Commercial Filters Corp., 2 Main St., Melrose, Mass.

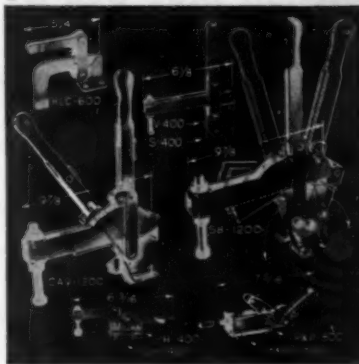
Use postpaid card. Circle No. 111

**THERE ARE
KNU-VISE
PRODUCTS
TO MEET YOUR EVERY
CLAMPING NEED**

(OVER 150 MODELS)

LAPEER devices are the choice of leading manufacturers for all operations requiring fast and reliable clamping.

Recognized as clamping engineers we can give you much valuable assistance. We will gladly discuss your clamping problem at your plant.



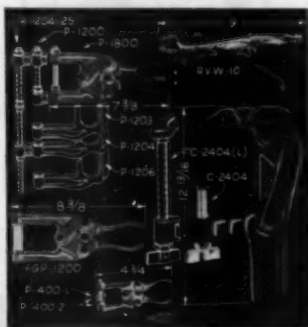
LAPEER MANUFACTURING CO.

3052 DAVISON ROAD, LAPEER, MICH.

Manufacturers of over 150 models of manually and air-operated clamps and pliers.

WESTERN DIV.: PECK and LEWIS CORP.
4436 Long Beach Ave., Los Angeles 58, Calif.

CANADIAN DIV.: HIGGINSON EQUIP.
SALES, 1131 Pettit Road, Burlington, Ontario



**UNMATCHED FOR RUGGED USE,
DEPENDABILITY,
SPEED AND LONG SERVICE**

They were developed through exhaustive tests in laboratory and years of practical use.



Machine Stamps Badges

This special ribbon hot stamping machine was developed by utilizing the standard Acromark 2AH press and adding the necessary controls, speeds, automatic dwell and pressure controls, self-leveiling unit and a special wide work area with ribbon roll, from which ribbon is pulled through the machine



Use postpaid card. Circle No. 373



Operating speeds to 60 strokes per minute.

People work better when they SEE BETTER®



RCA LABORATORIES researcher wears MAGNI-FOCUSER to work on new RCA semi-conductors that promise to break the Transistor "Heat Barrier."

For increased production, greater accuracy, fewer accidents and errors, use the MAGNI-FOCUSER—the new 3-D binocular magnifier with matched prismatic lenses. It provides needle-sharp vision—greatly magnified and in third dimension.

Scores of industrial jobs are being aided by the MAGNI-FOCUSER. It reduces eye strain and avoids squinting; leaves both hands free to work. It's light weight; can be worn with or without eye glasses; normal vision resumed simply by raising the head.

Speed your production by ordering now on 10-day trial basis without obligation. Only \$10.50. Immediate delivery. Or write for illustrated folder.

MAGNI-FOCUSER

the 3-D Magnifier that speeds production and leaves both hands free to work

EDROY PRODUCTS CO., Dept. 14, 480 Lexington Ave., New York 17, N. Y.

Use postpaid card. Circle No. 374

and hot stamped with convention designs. The press is furnished with or without a cut-off unit to cut the ribbon to proper lengths for badges. The marking area may be as long as desired up to 8" or 10" and the dies may be arranged in any position in the marking head, including interchangeable type if needed.

An oversized die chase slides out to the left on its own carriage and tips over for quick changing, thereby eliminating the necessity of carrying

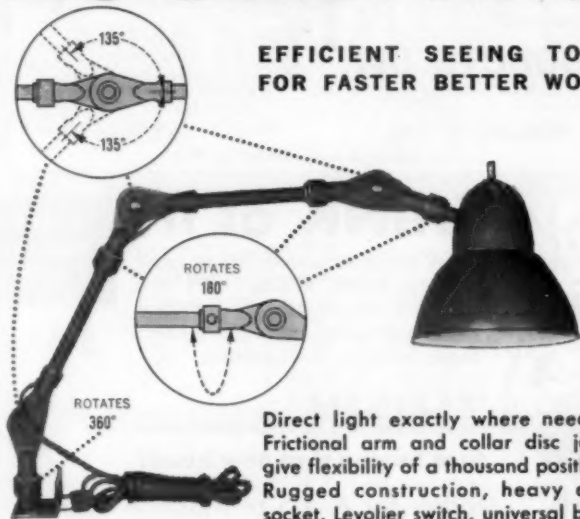
a heavy chase. A dual control is also featured, making it possible to run single stroke impressions or operate continuously with a timed stroke.

Operating speeds of up to 60 strokes per minute are provided. Electric motor, 220-440 volt three phase, 50-60 cycle with start-stop controls, is wired with overload and low voltage protection.

The Acromark Co., 15 Morrell St., Elizabeth, N. J.

Use postpaid card. Circle No. 112

FOSTORIA LOCALITES



**EFFICIENT SEEING TOOL
FOR FASTER BETTER WORK**

Direct light exactly where needed. Frictional arm and collar disc joints give flexibility of a thousand positions. Rugged construction, heavy duty socket, Levolver switch, universal base. Cool heat ventilating reflector.

MODEL 55-VCX-701

\$8.95 EACH



Inner Shield Accessory
for extreme coolness when
using 100-watt lamp.



Write for complete catalog.

Models for every industrial use.

FOSTORIA CORPORATION

FOSTORIA, OHIO

5903

Use postpaid card. Circle No. 375

Bay

immediate shipment on complete line

Specify BAY, the finest value in steel equipment, and be sure of receiving products which are designed properly—produced properly—unconditionally guaranteed. And you will receive them quickly!

OUR RECORD: Over 15 years satisfied use by leading national companies.

THE REASON: Our equipment is its own best salesman.

BAY PRODUCTS DIV.

AMERICAN METAL WORKS, INC.
BALDWIN 9-1805

1827 Cambria St., Philadelphia 32, Penn.

PRODUCTS

Write now for Free Catalog,
Complete Pricing Information,
and the name of your local
Bay Distributor.



WORK BENCHES
STEEL SHELVING
HANDICABINET®
BENCHES
STOCK CARTS

SERVICE TRUCKS
STACKING BOXES
PARTS BINS
SMALL PARTS
CABINETS AND
CASES

Use postpaid card. Circle No. 376



THINK of it!

NOW you can have a boring head that will BORE, FACE, TURN and GROOVE at no higher cost than you would pay for an ordinary, single purpose boring head.

THINK this over before buying that new head!

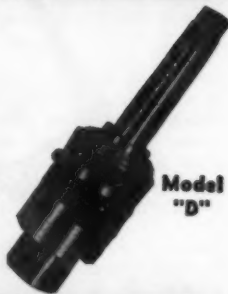
Models for Any Size Machine

Write today for full details

CHANDLER TOOL COMPANY

MUNCIE, INDIANA

A Boring Head
That Won't Face
is NOT Complete



Model
"D"

COMBINED BORING &

FACING TOOL HEADS

Chandler-Duplex

Use postpaid card. Circle No. 377

MACHINE and TOOL BLUE BOOK

SHIMS ADJUST DIE STRIPPER BOLTS. After grinding, shimming or repairing dies, the insertion of one or more De-Sta-Co lengthening or shortening shims establishes correct stripper plate height in seconds. They will not break or mushroom under impact. Accurate thickness, smooth finish, and close-tolerance diameters permit precise adjustment.

Detroit Stamping Co., 340 Midland Ave., Detroit 3.

Use postpaid card. Circle No. 113

LARGE CAPACITY ANGLE PLATE. Model 160 heavy duty adjustable angle plate features two T-slotted plates—one 8" x 18", the other 10" x 18". The top plate is adjustable from 0 to 45 degrees; the side plate is adjustable from 45 to 90 degrees. Over-all height of the tool is 8 1/4". The top plate has three 11/16" T-slots, and the side plate, two.

Universal Vise and Tool Co., Parma, Mich.

Use postpaid card. Circle No. 114



**THIS MAN DEPENDS
ON OTHERS TO MEET
HIS WHITE PRINT
DEADLINES**



**THIS MAN HAS
WHITE PRINTS IN
MINUTES FOR
PENNIES WITH
SATELLITE®**

SATELLITE WHITE PRINTER reduces reproduction costs up to 80% . . . and your investment is but \$199. Simple to use, with single dial operation in a compact desk or wall mount, the Satellite gives flawless quality white prints up to 30 inches wide from any translucent original . . . at approximately one cent per square foot. Write for details!

GRICO, INC., CUYAHOGA FALLS, OHIO

Use postpaid card. Circle No. 378

Internal Comparator Centers Automatically

The Intramess internal comparator has a spring loaded bridge, the cradle shaped ends of which form an equal sided triangle with the sensitive measuring contact of the instrument. By means of this bridge the instrument is automatically centered in the bore and permits measurements accurate to 50 millionths of an inch for checking of size, out-of-roundness, tellmouth,



Measurements are accurate to .00005".

taper and other irregular conditions at any diameter and any depth within

IMMEDIATE DELIVERY!



Cadmium plated, large selection of styles and sizes. Specials on request. Send for FREE catalog.

MACHINE PRODUCTS Corporation

6771 E. MICHIGAN ROAD - DETROIT 12, MICHIGAN

Use postpaid card. Circle No. 379

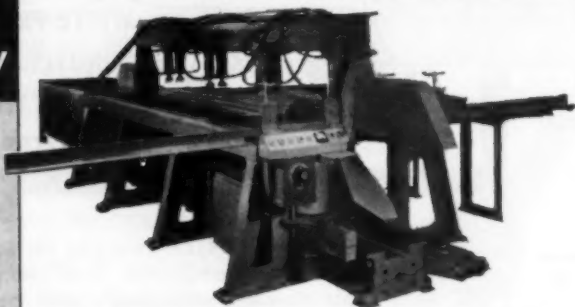
"OLIVER" NO. 838 PLATE SAW

**HEAVY DUTY
PRODUCTION
SAW**

for precision cutting of plates and sheets of all sizes up to 6" thick



NOW, good clean cuts within tolerance for nonferrous metals



For cutting aluminum, bronze, micarta, copper and other non-ferrous metals . . . adaptable to individual requirements, yet provides economy of operation . . . satisfies rigid demand for accurate work and fast cutting. Send for illustrated folder giving full details.

OLIVER MACHINERY COMPANY
GRAND RAPIDS 2, MICHIGAN

Use postpaid card. Circle No. 380

range of instrument. The amplifying unit employed is the sensitive Millimess comparator gaging head with shock-proof movement, fully jewelled and a total range of $\pm .002$ ".

To determine the correct diameter of the bore, the instrument is rocked along the axis in a pendulum-like manner, whereby the contact points traverse a line at a right angle to the axis. The maximum reading of the indicator hand during this motion corresponds to the true diameter of the

bore. Thus, in lathe work or surface grinding it is easy to observe how much material has to be removed from the bore to attain the inside dimensions required. For the checking of small bores, spring-loaded split jaw measuring heads are supplied, which are screwed into the instrument. The gages cover a range from .060" to 10.000".

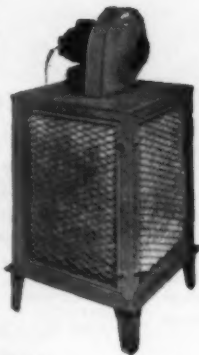
Mahr Gage Co., Inc., 274 Lafayette St., New York 12, N.Y.

Use postpaid card. Circle No. 115

TORIT Mist Collectors CONTROL wet machining MIST

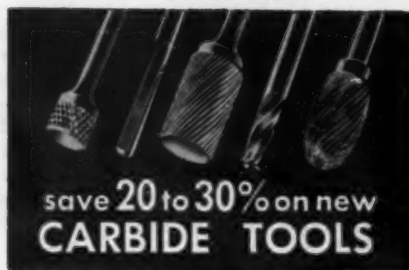
Wet machining operations produce floating fog and mist that could pollute the air in your plant. With the new Torit Mist Collector your men can breathe clean air and work in a safe, dry plant—while your maintenance costs go down! The new Torit Mist Collector filters out moisture through its spun glass filters—saves coolant that can be piped back into your cooling system. For full facts write today to . . . TORIT MANUFACTURING CO.

Walnut & Exchange Sts.
St. Paul 2, Minn. • Dept. 612



THE NEW TORIT MIST COLLECTOR

Use postpaid card. Circle No. 341



save 20 to 30% on new
CARBIDE TOOLS

RICO has a complete line of:
 • Quality rotary carbide & HSS tools
 • Available for immediate delivery
 • Big savings on new tool costs
 • Up to 50% savings on regrinds
 • Special tools to specifications
 • Distributor inquiries invited about better profit margins with **RICO TOOLS**.



Attach ad to your letterhead for more information.

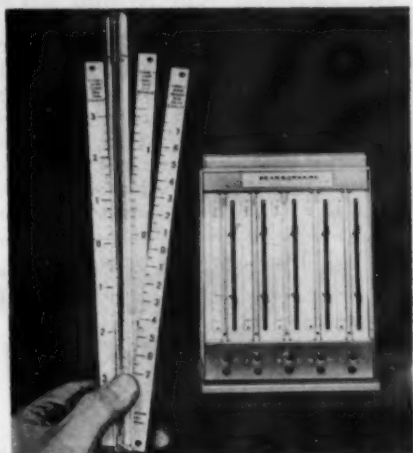
RICO TOOL CO.

5915 DIXIE HWY. • SAGINAW, MICH.

Use postpaid card. Circle No. 382

Air Gage Tube Improved

The Multi-Amp glass tube for column-type instruments can be used for three standard amplifications



Multi-Amp tube enables user to convert from one amplification to another (up to 5000:1) by changing calibrated scales.

ONE OF
ENGLAND'S
FINEST!

CVA
3 JAW GEARED
UNIVERSAL SCROLL

LATHE CHUCKS

WITH AVERAGE GUARANTEED ACCURACY
OF .002" THREE INCHES FROM JAW FACE

... And these
other
great features

ONE PIECE BODY
FLAME HARDENED JAW WAYS
INDUCTION HARDENED SCROLL FORM
COMPLETE WITH 2 SETS OF JAWS
AND CHUCK WRENCH



Size	Weight	Dia. of bore	Price*
3 1/2"	6 Lbs.	5/8"	\$34.00
4 1/2"	6 Lbs.	1-1/8"	34.00
5 1/2"	11 Lbs.	1-1/2"	40.00
6 1/2"	16 Lbs.	1-11/16"	46.50
7 1/2"	26 Lbs.	2-1/4"	55.00
9"	38 Lbs.	2-3/4"	70.00
10 1/2"	68 Lbs.	3-1/2"	86.00
12"	106 Lbs.	3-7/8"	115.00

*Prices f.o.b. warehouse, N.Y.C.
Back plates available at extra cost.

These are superior chucks produced by an English manufacturer famous for precision built machine tools and represent unbeatable values. A certificate is supplied with every chuck attesting to and guaranteeing its accuracy. All parts are guaranteed for a year against defective workmanship and materials. Repair parts available.

In stock for immediate delivery!

Manhattan Supply Company
151-A Grand Street, New York 13, N. Y.
Telephone CAnel 6-4992

Use postpaid card. Circle No. 383

(1250:1, 2500:1, and 5000:1), where formerly a separate tube was required for each. When you want to convert an instrument from one amplification to another, all that is required is a change of calibrated scales.

Key feature of the new tube is its characterized internal configuration, which incorporates a predetermined and precisely controlled variant rate of taper. The tube design creates an air circuit that is linear over the full ex-

tent of the calibrated scale—for finer accuracy and reliability of measured readings.

Dearborn instruments equipped with the Multi-Amp tube are available in single or multiple column units in amplifications of 1250:1, 2500:1, and 5000:1, or any combination thereof. Instruments of 10,000:1 amplification are also offered as standard equipment.

Dearborn Gage Co., Air Gage Division, 32330 Ford Rd., Garden City, Mich.

Use postpaid card. Circle No. 116

New **IDEAL** **GOLD BAND**

LIVE CENTERS

GUARANTEED TO MATCH ACCURACY
AND CAPACITY OF YOUR LATHES

In the GOLD BAND line Ideal has combined the latest production methods with their traditionally fine craftsmanship to bring you an unequalled standard of excellence in live centers. Accurate, (to $\pm .0001$ ") GOLD BAND Live Centers offer "custom" quality at production prices. Specify GOLD BAND Live Centers and your every need can be accommodated from stock . . . 99 times out of 100. Ideal's GOLD BAND Live Centers offer savings, simplified operations and higher lathe output both in quantity and quality. Contact your distributor today!



A COMPLETE LINE FOR EVERY
NEED—SPECIALS TOO!



IDEAL INDUSTRIES, Inc.

1441-H Park Ave.
Sycamore, Illinois

Use postpaid card. Circle No. 284

Write for

Complete catalog data
and specifications.

NOW... .2 TORQUE RANGES

both from one (to 900 Foot pounds)

STURTEVANT TORQUE WRENCH



Now you can do high torque work with a Sturtevant Torque Wrench of normal capacity range, small in size, light in weight, with fine increment markings and moderately priced.

With a new Multi range, Multi-purpose Adapter you can step up the capacity of your Torque Wrench to a new high range and you can plug in any drive end you want . . . Box wrench, ratchet, drive square for sockets.

All drive end accessories are interchangeable and stock items.

In this way each Sturtevant Torque Wrench effectively equals two complete sets of ordinary single purpose Torque tools.

Adapter Side rule sent FREE if requested on company letterhead.

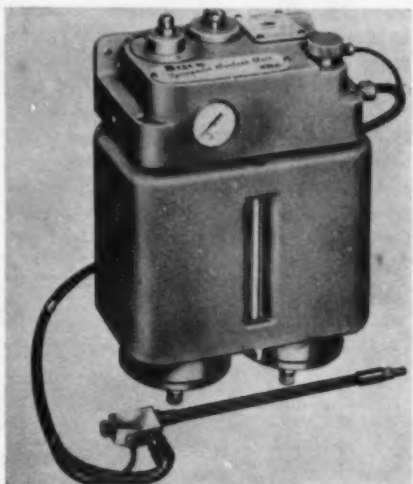


Wide Choice of Interchangeable Drivers

Use postpaid card. Circ e No. 385

Unit Provides Mist Cooling

Spray mist coolant equipment includes all the necessary controls in a



The one gallon capacity unit is commonly used on most production equipment.

NUMBERALL

WITH THE COST OF STAMPING NUMBERS

TYPE HOLDERS

to stamp metal products



STEEL TYPE

for PRESS STAMPING Model 23P



STEEL TYPE & BOX

Indexed Sectional Type Box with separate compartment for each character. Two sizes for small and large type. We can also make steel type with round face characters.

NUMBERALL STAMP & TOOL CO.

HUGUENOT PARK STATEN ISLAND 12, N. Y.

Use postpaid card. Circle No. 386

single compact unit. Elements provided are air filter, trap, regulator and gage, solenoid-valve and conduit box, pressurized coolant reservoir and filter.

The solenoid valve connected to the machine circuit starts the coolant unit when the machine is turned on. A range of settings from superfine mist to heavy spray is possible with the needle valve control in the Spraymist jet. Atomizing takes place in the jet

tip. One unit can supply up to 10 or more jets by branching from existing lines. Three types of jets are available. Replacement tips can be installed in seconds.

The one gallon capacity unit shown is commonly used on most production equipment. Also available is an 18 oz. capacity unit.

Bijur Lubricating Corp., 151 W. Passaic St., Rochelle Park, N.J.

Use postpaid card. Circle No. 117

When a Vise becomes a Virtue... It's a **MULTI-PURPOSE VISE** Outstanding Quality • Economy Priced

4 hardened stepped jaws permit clamping of rough castings, irregularly shaped, round, and tapered pieces accurately and quickly, eliminating need for special jigs or fixtures. Narrow stepped jaws allow free access to and measuring of work pieces and provide clearance for cutting tools. Small work pieces machined on three sides without reclamping. Rigid in any position.

Various capacities and extra soft jaws available.

— Complete repair facilities available — replacement parts in stock.

Write also for literature and prices on MBI Reversible Tapping Attachments, Keyless Drill Chucks and Dial Vernier Calipers.

Manufacturers representatives and dealer inquiries invited!



Model VD/O



M.B.I. EXPORT AND IMPORT Ltd.

A DIVISION OF MACHINERY BUILDERS, INC.

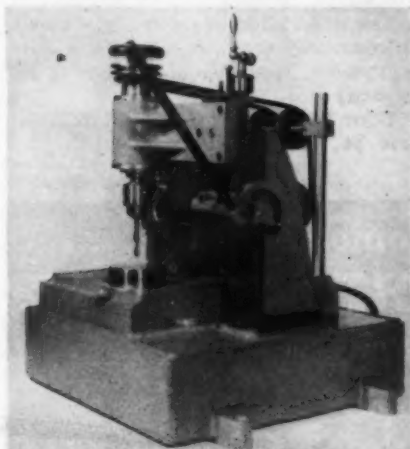
475 Grand Concourse, Bronx 51, N. Y.

"Over 25 years' experience in designing and building machinery"

Use postpaid card. Circle No. 387

Drill Press For Small Precision Drilling

Drill press available for small precision drilling takes standard Magnus-



Drill press using Jacobs 1A drill chuck.

Elect collets with a maximum run-out of .0002", as well as Jacobs No. 1A drill chuck. Special accuracy (.0001") collets can be supplied.

Dimensions of the machine are—13"x 13" base; maximum height from table to top of column, 15"; throat depth, 3½"; maximum height from top of table to headstock, 4".

F. W. Derbyshire, Inc., Waltham, Mass.

Use postpaid card. Circle No. 118

Lamp Detects Oil

The need for a rapid, positive test for oil contamination on oxygen service equipment has incited the develop-



Portable Model B-100 is an all-around unit for tests and production line inspection.

Polyethylene Bags So Cheap!



NOT A WHISPER—of bad packaging in NBC POLYCLEER BAGS.

They are the newest of everything great. Transparent, indestructible, heat sealing, quick opening, protective, consumer reusable, AND economical.

The perfect self-selling impulse sales package for any product.

NORTHLAND manufactures NBC POLYCLEER BAGS by the millions.

All Sizes • Gauges • Styles • Shapes
Plain and Printed 1-2-3-4 Colors
Write! Wire! Phone!

NORTHLAND BAG CORP.
53-C School Street, Yonkers, N. Y.
GREENleaf 8-1025

Use postpaid card. Circle No. 388

SAVE TIME and MONEY 101 REPAIRS



3 lbs.
4.10

Lab-metal

Spreads like paste—Hardens to metal
Metal • Wood • Plaster • Glass • Plastic
EASY! FAST! NO MIXING!

Available at your distributor or write
ALVIN PRODUCTS, Inc. Worcester 4, Mass.

Use postpaid card. Circle No. 389

MACHINE and TOOL BLUE BOOK

ment of a technique using a high-intensity Blak-Ray (black light) lamp. Hydrocarbon contaminants, invisible in ordinary light, are quickly detected by their characteristic blue/white fluorescence under this lamp.

The portable Model B-100, for 110 volt AC operation, is recommended as an all-around unit for tests or production line inspection, while the BLF-6 unit, with the No. 102 power-pack

case, is completely portable for field as well as for shop use.

Of special interest to welding shops is the ability of these units to detect welding slag by its blue/green fluorescence and thereby prevent slag inclusions in specification welding.

Black Light Eastern Corp., 201 Northern Blvd., Bayside, N.Y.

Use postpaid card. Circle No. 119



THE QUALITY EXTRA...

in **S&E** Tungsten Carbide Tools
— IS FREE

Tool performance that increases your production and profits—yet costs you less money . . . it's what you want and what you get —when you use S&E TOOLS

That extra quality is no accident. It is the product of more than 20 years experience in the design and manufacture of Tungsten Carbide Tools.

Prove to your own satisfaction that the performance and stamina you need in tooling today—you get in S&E. A fully illustrated catalog of standard and special tools is available upon request.



WRITE:

S&E MACHINE
PRODUCTS INC.

Bridgeport, Michigan
Representatives in all principal cities.

Use postpaid card. Circle No. 390

JIG GRINDING and JIG BORING to your specification

At your disposal: Our sub-contract jig boring department, one of the best equipped in the East.

A. K. TOOL CO., INC.

ROUTE 22, MOUNTAINSIDE, N.J.

Telephone: ADams 2-7300

Use postpaid card. Circle No. 391

WILSON AIR COLLET CLOSER



STEP UP PRODUCTION 20% +

... for most lathes to 1"
bar stock capacity

- Hold delicate parts without damage or adjustment
- Iron grip for heavy work
- No adjusting for stock or part variations
- Finger-tip or foot control eliminates operator fatigue
- Eliminates jarring of head stock

(Ten day FREE TRIAL to reliable firms)

WILSON AIR COLLET CLOSER, INC.
909 40th Ave. NE, Minneapolis 21, Minn.

Use postpaid card. iCircle No. 392

Spring Winder for Small Production Runs

The Porter spring winder quickly winds extension, compression and torsion springs in sizes from 1/8" to 1 1/4" i.d., any length, right or left-hand coils.



Any length springs, 1/8" to 1 1/4" i.d.

Wire sizes range from finest music wire up to 3/16" dia tempered spring wire.

The winder may be clamped on workbench or held in a vise. It is useful for making replacement springs, experimental work and small production runs. A pitch gauge regulates distance between coils, may be disengaged while winding compression springs to form closed end coils. A cam-lock tension release duplicates the tension in springs produced in quantities.

Advance Car Mover Co., Appleton, Wis.

Use postpaid card. Circle No. 120



SPELLMACO "SPOTTERS"

A matched set of transfer punches
for toolmakers, machinists & tool cribs

Used for transferring location of threaded, drilled
and reamed holes, slugs, blanks, etc.

Precision made of finest tool steel—Carefully heat treated and tempered for
long life—0025 undersize to facilitate use—Black oxide finish

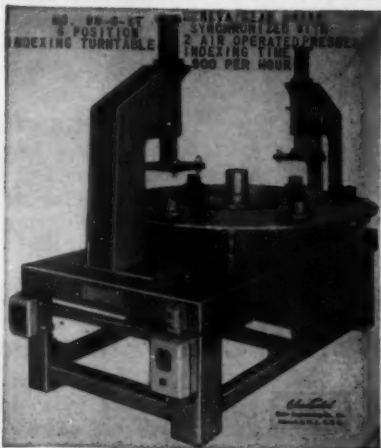
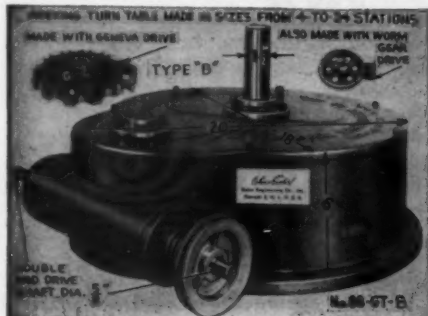
Set No. 3-17, 28 punches with indexed stand—sizes 3/32" to 1/2", by 1/8"—
plus handy 17/32" size. Length 4 1/2" ONLY \$17.00
Single sizes available

R. L. SPELLMAN CO. - URBANA, OHIO

Use postpaid card. Circle No. 393

INDEXING MACHINERY — CAMS — GENEVA GEARS — TURNTABLES

EISLER MAKES OVER 300
DIFFERENT TYPES OF
INDEXING TURNTABLES.
SPECIAL MADE TO YOUR
SPECS. WRITE FOR CATALOG.



Dr. Charles Eisler Me. Founder Charles Eisler, Jr. Pres.
EISLER ENGINEERING CO., INC.
762 SOUTH 13th STREET NEWARK 3, NEW JERSEY

Use postpaid card. Circle No. 394



COMPARE

Spraymist®

ENGINEERED BY

BIJUR

Only Spraymist Provides

- Compact, Unit Design — Includes ALL necessary controls: — Trap-Filters — Regulator — Gauge — Solenoid Valve — Reservoir.
- Automatic Operation — Mist starts and stops automatically with machine.
- Pressurized Reservoir — Prevents clogging or siphon lift problems — Provides more uniform flow — Permits extending system to as many jets as needed.
- Precision Mist Control — Needle Valve at each jet allows for convenient control of uniform, continuous mist, from superfine to heavy spray — Easily replaceable jet tips.
- Machine tool styling — Fully protected against corrosion — Sturdy construction — Choice of 18 ounce, 1 gallon or 5 gallon reservoir capacity.

plus:

Write today for Bulletin MTF-7, and the name of your nearest SPRAYMIST distributor.



A product of

BIJUR

LUBRICATING CORPORATION
Rochelle Park, New Jersey



Use postpaid card. Circle No. 395

2054

August, 1959

235



RECONDITIONED THROWAWAY INSERTS. In comparison with the cost of new inserts, these reconditioned carbide throwaways afford savings up to 50%. They are precision cam ground .010 minus on i.c. and can be furnished with radii ranging from .030 upward. All inserts are carefully inspected and are sold on a money-back guarantee. Carbide Ceramic Products, Hazel Park, Mich.

Use postpaid card. Circle No. 121



WHEEL GRINDS AND FINISHES. The Bayflex Double-Duty raised hub disc-wheel for portable grinders is specially designed to cut down-time in welding operations. The wheel's two-layer construction permits two different grinding angles so that grinding and finishing operations can be accomplished without stopping to change wheels.

Bay State Abrasive Products Co., Westboro, Mass.

Use postpaid card. Circle No. 130

Dial Comparator and Stand

The new Kwik-Chek precision dial comparator incorporates the following features: direct reading in 0.00005"; range of 0.004"; fully jeweled and shock resistant; dual gaging contact pressure.

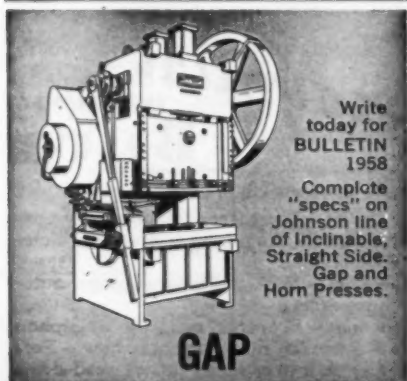
The stand offers vertical range of 4". Fine adjustment insures accurate setting. Over-all height is 8.5", steel



anvil 2" diameter—hardened, ground and lapped.

Hamilton Watch Co., Lancaster, Pa.

Use postpaid card. Circle No. 131



Write today for BULLETIN 1958
Complete "specs" on Johnson line of Inclined, Straight Side, Gap and Horn Presses.

GAP



Use postpaid card. Circle No. 396

LEAD HAMMERS—
Buy Cook "SHUR-GRIP"

They're a MUST in every shop where many blows have to be struck without marring surfaces. Available with "SHUR-GRIP" drop forged handles.

Write for circular and prices

Cook's Lead Hammer Service

67 Massachusetts Avenue East Providence 14, R.I.

Use postpaid card. Circle No. 397

MACHINE and TOOL BLUE BOOK

Notch 12 PIPE ENDS per MINUTE

Make Perfect Joints for Welding or Brazing

ARC-FIT

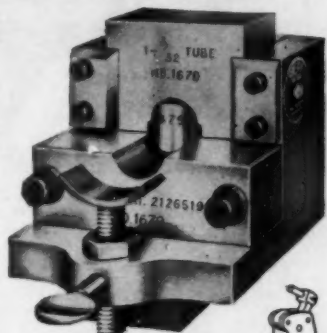
REG. U.S. PAT. OFF.

**NOTCHES CLEAN
NO FINISHING**

Standard ARC-FIT in hand or power press shears contours for "T" joints for 1/2" to 2" pipe or tubing with easily interchanged dies. Special ARC-FITS for larger sizes, angles other than 90°, slotting or notching square pipes, angle iron or flat stock.

VOGEL TOOL & DIE CORPORATION

1827 N. 32nd AVE. • STONE PARK, ILL.



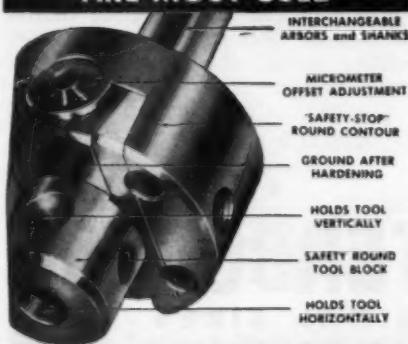
Send for
descriptive
literature

Standard Arc-Fit
works well in our
special HAND PRESS



Use postpaid card. Circle No. 398

7 REASONS WHY FLYNN BORING HEADS ARE MOST USED



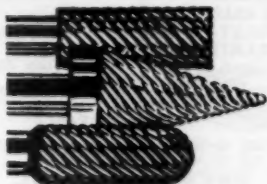
**LEADING NAME IN
BORING HEADS FOR 40 YEARS**
19 MODELS Write for catalog

FLYNN MANUFACTURING CO.
8301 WEAVER • DETROIT 28, MICH.

Use postpaid card. Circle No. 399

August, 1959

WRITE FOR FREE CATALOG



- ★ Ground Cut Rotary Files for Soft Metals.
- ★ Hand Chisel Cut for Hard Metals.
- ★ Carbide Rotary Files.
- ★ Salvage and Regrinding Service.
- ★ Dealers Inquiries Invited.

ROTA FILE CORP.

1328 58th STREET

BROOKLYN 19, N. Y.

Use postpaid card. Circle No. 400

STOP... HAND WORK



Use these handy PORTABLE ELECTRIC RECIPROCATING TOOLS for Greater Production, Better, More Uniform Work — All with less Operator Fatigue. Fixed strokes are $\frac{1}{8}$ " or $\frac{3}{16}$ " long. Operate on 110 Volts AC-DC. Deliver 1000 PUSH-PULL strokes per minute. Try one of these tools on your next job.

Send for Descriptive Literature.

ACME TOOL CORP.

73 W. Broadway • NEW YORK 7, N. Y.

Use postpaid card. Circle No. 401

BREMIL

The IMPROVED Compound Lever Shears



No. 1 cuts up to No. 11 gauge strip or sheet.
No. 2 cuts up to $\frac{1}{4}$ " steel plate.

BREMIL MFG. CO.

1020 Holland Street, Erie, Penna

Use postpaid card. Circle No. 402

Attachment Permits Rotary Milling With Power

The Roto-Torque unit is a power attachment for Troyke and many rotary hand feed milling tables. These rotary tables can now be changed from hand feed to power feed in less than one minute.



Smooth finish is reported possible on all special form work—radii, contours, cams or cavities—avoiding much unnecessary hand polishing.

The unit has variable speed control so that the table can be run at proper milling speeds, also forward and reverse switch.

M & M Tool Mfg. Co., 1124 East Third St., Dayton 2, Ohio.

Use postpaid card. Circle No. 122



COUNTERBORES

IN DECIMAL SIZES

ALSO Chucking and Stub Reamers
THOUSAND'S by the THOUSANDTH'S

Write for Latest Catalog and Prices

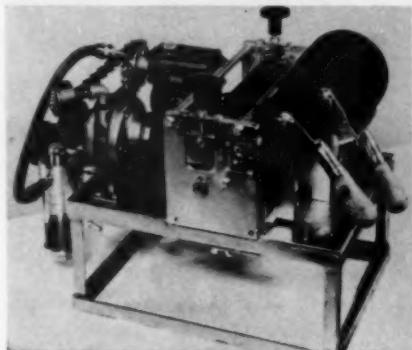
TWENTIETH CENTURY MFG. CO.

Box 429-BB LIBERTYVILLE, ILL.

Use postpaid card. Circle No. 403

Portable Inking Machine

This small (14" x 19" x 14") air operated portable machine uniformly coats hand transfer rollers which in turn transfer the color to the work. One roller is being inked while the second is in use.



Rollers of two different sizes are used alternately in this application.

A speed reducer permits accurate control of the pick-up and distributing rollers in order to accommodate various coating materials. The machine comes equipped with air filter and automatic lubrication. Diameter of rollers is predetermined so that roller circumference distance permits coating the length of the work with one pass with each roller inking. (Illustrated is an instance where rollers of two different sizes are used alternately.)

Conforming Matrix Corp., 394 Toledo Factories Bldg., Toledo 2, Ohio.

Use postpaid card. Circle No. 123

JIG BORING

and

Large Precision Machining
Done to your specifications

WE HAVE 22 JIG BORERS

KIDDE PRECISION TOOL CORP.

25 LOCUST AVE. ROSELAND, N.J.

Use postpaid card. Circle No. 404

August, 1959

AFTER YOU CUT THEM...



How do you use them?

How you use material *after* you cut interests Wallace as much as does the alloy, or size or the shape you cut. If, after the cut, you need smooth cut ends, free of burn, and nearly burr-free, then Wallace Cut-Machining is definitely *your* type of cutting.

For Wallace Abrasive Cut-Machining Units give your material two smooth "machined-like" ends with the first cut. Often no further end-machining is needed. Here is economy with every cut of solid bars, structurals, small and "big-inch" pipe and tubing, any alloy. The right Cut-Machining Unit for your special requirements can be quickly determined at no cost or obligation to you.

So? Let's discuss your cutting problem. Write, or

Call Wallace Collect *See*
Chicago number: **BUckingham 1-7000**

Ask for CUTTING CLINIC
and reverse charges, please!

THIS BOOKLET

shows you how Cut-Machining
solves other cutting problems.
Be sure to ask for it. It's free.



Write, if you prefer, to

WALLACE SUPPLIES MFG. CO.

1300 W. Wolfram Street • Chicago 13, Illinois

Use postpaid card. Circle No. 405

239



TAP BUSHINGS

Drives all standard taps from No. 0 to 1 1/2" and pipe taps from 1/8" to 1". Five o.d. sizes.

LESS TAP BREAKAGE
LESS TAP WEAR

Write for Bulletin

BYCO INDUSTRIES

2201 Snelling Ave., Minneapolis, Minn.

Use postpaid card. Circle No. 406

SPECIFY Dependable GRAYMILLS COOLANT PUMPS

for Replacement and Original Equipment

Here is a pump that complements the finest machines—rugged, dependable, abrasive proof. Obvious quality... priced right too. 50 standard models. Sold by Industrial Distributors.

WRITE FOR
CATALOG 56 JH

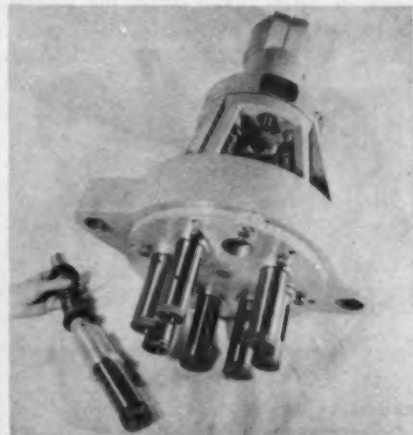
Graymills Corp.
3721 N. Lincoln Ave.
Chicago 13, Ill.



Use postpaid card. Circle No. 407

Cartridge Spindle Plates Offered on Drillheads

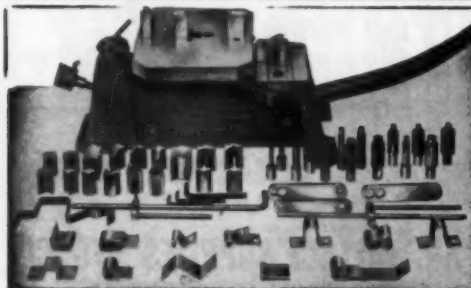
Fast, easy removal of spindles, bearings and related parts are features of the cartridge type spindle plate construction now available with Thrift-



Eight-spindle head with new construction. master universal joint type adjustable drillheads. The new cartridge plate provides spindle rigidity and accuracy of fixed center heads while retaining the adjustable feature for application to various hole patterns. Removal of one lock screw permits the cartridge containing spindle, bearings and related parts to be removed from the plate as a complete unit.

Thriftmaster Products Corp., 1030A N. Plum St., Lancaster, Penn.

Use postpaid card. Circle No. 124



Multiform BENDER CUTTER

CUTS, BENDS, PUNCHES

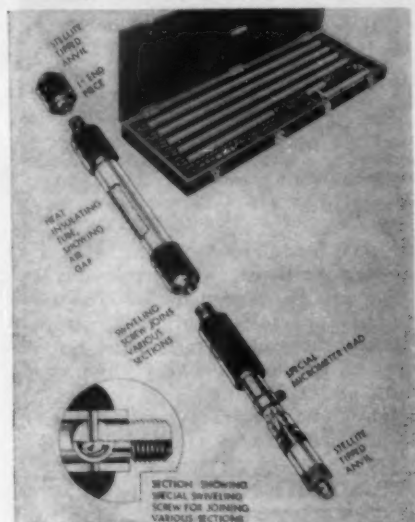
Available in hand, air and hydraulic models, the MULTIFORM is shipped complete with full assortment of dies and mandrels to punch, bend, and cut round or flat brass, bronze, aluminum, steel, etc., up to 1/2"x1 1/2" as illustrated, other models up to 1/2"x8".

J. A. RICHARDS CO.
KALAMAZOO, MICH.

Use postpaid card. Circle No. 408

Micrometer Measures to 40'

Accurate measurements up to 40' are claimed with the Matrix Stick micrometer sets which are helpful in the building of aircraft, missiles, tanks,



automobiles, large machinery, and for the various jigs and fixtures used in their manufacture.

The set comprises a micrometer head reading in .001" increments, a 1" spherical-end piece, and additional pieces ranging in size from 1" to 24", sufficient to join for any length.

Engis Equipment Co., 431 S. Dearborn St., Chicago 5, Ill.

Use postpaid card. Circle No. 125

CAMS

To Your Specifications
except Screw Machine Cams

Design Assistance Offered

KIDDE PRECISION TOOL CORP.
25 LOCUST AVE. ROSELAND, N.J.

Use postpaid card. Circle No. 409

August, 1959

Great Buys from

VICTOR

Extra Long, Straight Shank
High Speed Drills

12" OA, 9" FLUTE

SIZE	PRICE	SIZE	PRICE
1/8	1.65	27/64	3.30
9/64	1.75	7/16	3.30
5/32	1.75	29/64	3.60
11/64	1.85	15/32	3.60
3/16	1.85	31/64	3.60
13/64	1.95	1/2	3.60
7/32	1.95	33/64	4.20
15/64	2.05	17/32	4.20
1/4	2.05	35/64	4.30
17/64	2.15	9/16	4.30
9/32	2.15	37/64	4.75
19/64	2.25	19/32	4.75
5/16	2.25	39/64	5.00
21/64	2.50	5/8	5.00
11/32	2.50	21/32	5.40
23/64	2.75	11/16	5.80
3/8	2.75	23/32	6.25
25/64	3.05	3/4	6.75
13/32	3.05		

18" OA, 13 1/2"-14" FLUTE

SIZE	PRICE	SIZE	PRICE
3/16	4.00	9/16	8.75
7/32	4.10	19/32	9.30
1/4	4.10	5/8	10.00
9/32	4.75	41/64	11.00
5/16	4.75	21/32	11.00
11/32	5.25	43/64	12.00
3/8	5.25	11/16	12.00
13/32	6.00	45/64	13.00
7/16	6.00	23/32	13.00
15/32	6.50	47/64	14.00
1/2	7.00	3/4	14.00
17/32	8.50		

Order Today

IMMEDIATE DELIVERY!

VICTOR
MACHINERY EXCHANGE INC.

Dealers in Tool Room Equipment

251 CENTRE STREET, DEPT. DA
Tel.: CANAL 6-5575, New York 13, N.Y.

Use postpaid card. Circle No. 410

Honing Machine Removes Stock from Large Diameters

Heavy duty horizontal Microhoning machine Model B-612 is used primarily on applications requiring heavy or rapid stock removal from large diameters and longer than average bores.

For one application, Microhoning bores in oil well liners that are hardened to 64 Rockwell C, a special feed unit on the machine, capable of exerting a thrust force measured in tons instead of pounds, makes possible the removal of 1.3 cu. in. of stock per minute—a rate at least twice that of previous honing capacities under comparable conditions.

This Microhoning machine has two separate feed clutches—one for rapid approach and tool collapse, the other



Model B-612 shown Microhoning bores in oil well liners that are hardened to 64 Rockwell C. These bores range from 4.50" to 7.75" in diameter and up to 30" long.

for finer feed. The feed unit also includes a mechanism that automatically compensates for abrasive wear. The machine has a 4-ft hydraulic head stroke, 8-speed transmission, and is equipped with a variable delivery hydraulic pump and tank unit.

Micromatic fixturing on this application embodies two work-holding sta-

Universal "FULL-FLO" COOLANT NOZZLES with AERATOR
Ask for IPB-Sec. 2A Bulletin
Quality... ALL METAL FLEXIBLE HOSE PRODUCTS
UNIVERSAL METAL HOSE CO.
2153 South Kedzie Avenue, Chicago 23, Illinois

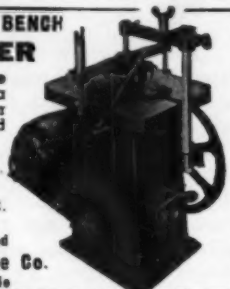
Use postpaid card. Circle No. 412

READING BENCH KEYSEATER

Portable — move directly to job; a time saver for both small and large shops.
3 3/4" stroke adaptable to other work.

Low first cost. prompt delivery.
Good dealers wanted

Reading Machine Co.
Cincinnati 37, Ohio



Use postpaid card. Circle No. 413



DIXIE ELIMINATES HAND FINISHING

Dixie Tool leads the way in the production of solid carbide precision cutting tools for die sinking and die making. Where precision and constant radii and angles are required, Dixie solid carbide ball end mills and die sinking cutters maintain their true angle and radius to help eliminate time consuming hand finishing.

Get 10 to 20 times longer tool life with Dixie's exclusive "Micro-Finish" process, and Super-sharp tools required for production of precision dies and molds in today's industry.



SEND FOR OUR
NEW CATALOG

DIXIE TOOL INDUSTRIES
4555 W. FRANKLIN AVE.
BRIDGEPORT, MICHIGAN

Use postpaid card. Circle No. 414

tions, permitting loading of a second part while the first part is being Micro-honed. A hydraulic mechanism indexes the finished part to the unload station and rotates the unhoned part into the machining position. The fixturing is adjustable for various o.d.'s and lengths. Also, machine and fixture controls are interlocked for automatic operation.

Micromatic Hone Corp., 8100 Schoolcraft Ave., Detroit 38, Mich.

Use postpaid card. Circle No. 126

Instrument Checks Radius of Cutting Tool

Super-accurate machining of hemispherically shaped workpieces requires absolute control of the radius of the cutting tool edge. Inaccuracies in this radius will produce inaccuracies in the workpiece relative to the template. In hemisphere turning, the cutting section of the tool radius varies over a 90° range between the axis and the equator of the part. Therefore, all varia-

STOP
You can't afford it!

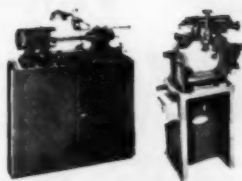
As the pictures show, taps cost roughly 6 times as much as drills. Yet it's common practice to re-sharpen the drill — and throw away the tap.

It doesn't make sense. And it's an awful waste of money.

That's where Blake comes in.

Blake makes low cost, high-precision tap grinding equipment. These easy operating tools can make your taps last up to 6 times longer . . . reduce work spoilage . . . enable taps to cut more accurately and uniformly with less strain . . . cut tap costs as much as 65%.

It's surprising how many people overlook this proven, basic method of saving money. Be sure you don't. Ask us for complete information.



Blake Chamfer Grinder/Blake Flute Grinder

used in combination, create or restore:

1. exact indexing of cutting edges.
2. controlled rake angles for each job.
3. correctly ground spiral points.
4. perfectly relieved chamfers . . . make one tap do work of six!



EDWARD BLAKE COMPANY, INC., DEPARTMENT 12, 570 PLEASANT STREET, WATERTOWN, MASSACHUSETTS WA 6-0100

Use postpaid card. Circle No. 415

LINLEY JIG BORERS

Give You Maximum Utility—At Low Cost



The improved Linley Jig Borers are more efficient than ever. Accurate and fast in operation—easy to set up. Made for the exacting requirements of small part precision work. Using Linley Jig Borers allows larger capacity borers to be used where intended, on heavier jobs. Once you've installed a Linley, you'll wonder how you got along without it in your shop. Table Size: 7" x 17½" Table Travel: 6½" x 10"

Send for Complete details.

LINLEY BROTHERS CO.

JIG BORERS - RIVET SPINNERS

663 State St. Ext., Bridgeport 1, Conn.

Use postpaid card. Circle No. 416

SPECIFY

STANDARD



WOODRUFF KEYS

ALSO FOR

- TAPER PINS
- MACHINE KEYS
- MACHINE RACKS

STANDARD WOODRUFF KEYS are STANDARD in many plants including the large automotive manufacturers. Why? Because STANDARD Keys are precision made and tested before shipment. Available in all standard sizes for prompt shipment. Sizes range from ½" x 1/16" to 3½" x ¾". Specify STANDARD Woodruff Keys and other STANDARD products.

WRITE TODAY FOR CATALOG

STANDARD STEEL SPECIALTY CO.

BEAVER FALLS • PENNSYLVANIA

Plants: Beaver Falls, Pa.; Hammond, Ind.

Use postpaid card. Circle No. 417



Precision radius checking instrument, along with an electronic checking device

tions from a true radius are transmitted directly to the workpiece.

Precise measurement of the tool nose radii is said to be achieved on the new Monarch precision radius checking instrument. It consists of a main

CAM MILLING

Fully equipped modern machine shop with extensive Jig Boring, Surface Grinding, Horizontal Boring and Thread Grinding facilities as well as modern Cam Milling and Cam Grinding equipment.

Your Inquiries Answered Promptly

HIMOFF MACHINE CO. INC.
23-22 40th Road Long Island City 1 N. Y.

Use postpaid card. Circle No. 418

New Discovery

LAPS EVERYTHING!

CERAMIC-BRASS-CARBIDE-PLASTIC-STEEL

Lasts for years

Never Leads - Self Cleaning - Indestructible
Money Back Guarantee

1/3 Price of Diamond



GRITS: 180-220-360-500 \$8.75

Newtools Inc. Amityville, New York

Use postpaid card. Circle No. 419

MACHINE and TOOL BLUE BOOK

frame, a means for holding and positioning the measuring head, and a means for mounting and adjusting the tool. Also required is an electronic checking device which is not supplied by Monarch. The Monarch checker may be equipped for the recording of tool contours on a direct reading oscillograph.

The tool is mounted on a vertical slide on the main frame, where it may

be positioned in the correct relationship to the measuring head. A set of five checking balls is provided to be used as standards. They are mounted on shanks and are of the following sizes: 1/16", 1/8", 1/4", 3/8" and 1/2".

If the radius dimension differs from that of the standard ball, the precision micrometer head is adjusted to determine the amount of error. Should the nose of the tool be other than a per-

Up To **10,000 psi Oil** from **Shop Air!**

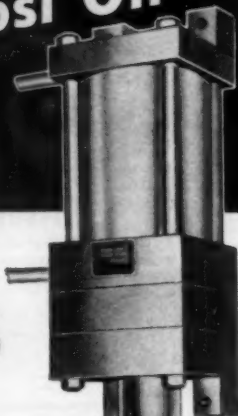


**AIR TO
HYDRAULIC**

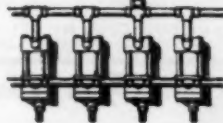
BOOSTERS

**No Pumps or High Pressure
Valving Needed**

Hook a Miller Air-Hydraulic Booster to your air line and get **INTENSIFIED** (ratios up to 100 to 1) Hydraulic Power that you can vary and control at will and use for such common shop operations as punching, clamping, pressing, riveting, shearing, welding, crimping, testing, etc. High pressure booster output drives the hydraulic work cylinders and can be directly applied (without cylinders) in testing, measuring, other applications. Boosters save air, space, weight, require little or no maintenance, and hold pressure as long as desired without additional power consumption. Models for immediate delivery.



**Model 77
Shown**



**Write For
Full Details**



FLUID POWER DIVISION

P. O. Peedy Corp.

7N022 York Road

Bensenville, Ill.

fect radius, deviations are read on the electronic indicating device. Location of these deviations can be recorded with respect to the angular position of the measuring head.

Monarch Machine Tool Co., Sidney, Ohio.

Use postpaid card. Circle No. 127

Turret Drill Improved

The Burgmaster Model 1-C turret drill, $\frac{3}{8}$ " diameter drill capacity in steel,



New Roto-Pin type lock is integral part of all Pannier Supreme Holders... eliminates loose, bent, dropped, or lost pins... flip it open to change type... flip it back to securely lock type in clear-marking position.

Write for complete data.

PANNIER'S SUPREME HOLDER WITH ROTO-PIN LOCK
Safe, fast type changing. Holder in variety of styles.
Machined from High-Grade Bar Tool Steel. Hardened anvil maintains type alignment. Striking Head of Tool Steel... Replaceable to add long service life to Holder.

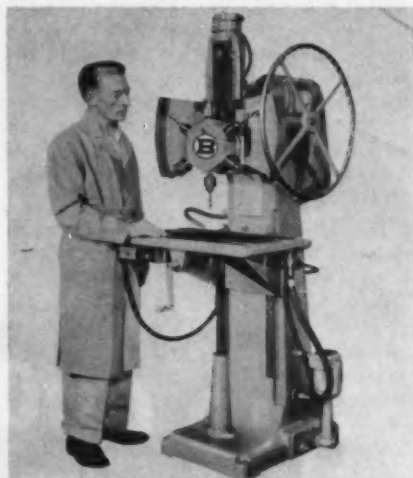


MARKING DEVICES
THE PANNIER CORPORATION

203 Pannier Building • Fairfax 1-5185 • Pittsburgh 12, Pa.

Offices: Los Angeles • Chicago • Cleveland • Philadelphia • Birmingham

Use postpaid card. Circle No. 421



Each spindle operates at its own speed.

now has a heavier, simpler transmission and clutch assembly to drive the six spindles. The turret head is counterweighted by an easily adjustable coil spring to provide a sensitive counterbalance for the turret and slide regardless of the weight of tooling mounted in the turret head. The spring can be set so that it returns the slide to the top of the stroke or so that it just counterbalances the weight of the slide and head. New gibs maintain greater accuracy for long periods of time.

Power indexing turret permits a se-

***You Need an Extra Hand Now
to Speed Up Production!***

HEIMANN TRANSFER SCREW SETS

Here is the faster, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench—no other tools needed. Get more work now—save money too!

HEIMANN MFG. CO. • URBANA, OHIO

Use postpaid card. Circle No. 422

quence of operations for a given hole to be performed at a single setting. The machine always operates at its most efficient spindle speed for each spindle by providing 12 preselective spindle speeds, ranging from 325 to 4050 rpm. Depth control is also provided for each spindle and is preselective and automatically indexed with the turret.

The Model 1-C has a 14" x 24" table with T-slots and coolant trough. The spindle travel is 7" and the machine provides a maximum clearance of 28" from spindle nose to extra low table. It is powered by a 1-hp, 2-speed, 3-phase, 60-cycle motor.

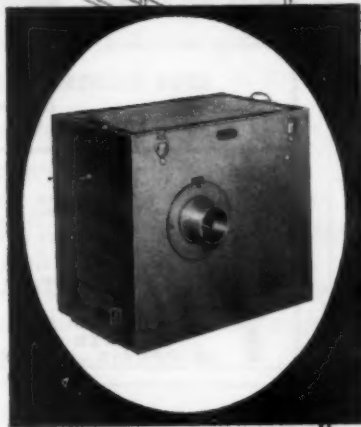
Burg Tool Mfg. Co., Inc., Gardena, Calif.

Use postpaid card. Circle No. 128

DUSTKOP "520"

designed to collect dust from
single machines

portable —
easily installed



Self-contained Dustkop models like the "520" are practical and effective in collecting dust from single machines. They're designed specifically for service with surface grinders, tool and cutter grinders, offhand

grinders, buffers and other small wheel equipment. These units are also easy to install — are actually portable — and very economical to operate.

Write for illustrated literature
46 models to choose from!

NEW DUSTKOP AUTO SHAKER
shakes filters AUTOMATICALLY

AGET manufacturing company
1402 E. Church Street, Adrian, Michigan

ask for
details

Use postpaid card. Circle No. 423

The MARKET PLACE

Advertisements acceptable in THE MARKET PLACE include those for employment, sales services, production facilities, representation and related needs. Rates: \$30 per column inch per insertion. Maximum size advertisement accepted in this section is three inches.

Copy should reach us by the first of the month for next month's issue.

MACHINE and TOOL BLUE BOOK

A Hitchcock Publication

Wheaton, Ill.

TAPS RECONDITIONED

End Only20%

Ends and Flutes40%

of price of new ground thread tap.

Don't pay unless you are satisfied.

CUTTING TOOLS, INC.

134 Seymour Street
Stratford, Conn.

POCKET SOC-KIT

Handy holder for your Hex wrenches; fits neatly in shirt or pants pocket; made of Neoprene rubber. It is not affected by oil or solvents; holds socket head bolt sizes #5 thru 9/16; also set screw sizes #10 thru 3/4; reverse side has tap index of 14 sizes 6/32 thru 1/2.

(Wrenches not included.)



At Your Dealers **65c**

AGON ENGINEERING CO.

14249 Dorcy St.

Detroit 23, Mich.

Dealer Inquiries Invited

1 Minute

to locate on edge within .0005"



JUMP EDGE FINDER

PRICE \$2.50 Complete satisfaction — or full refund.

Postage free if payment with order

ELISHA PENNIMAN

ELMWOOD 10,
CONN.

END MILLS SHARPENED

60c PER END up to an including 1/2" dia. 20c each 1/2" over 1/2". Send us your worn, dull or chipped end mills for like-new sharpening. We also sharpen and recondition Milling cutters, Woodruff Keyseal, and other cutting tools. Satisfaction guaranteed.

Supreme Keyseat Cutters Co.

1328 43rd St. OL 4-5800 Kenosha, Wis.
Manufacturer of Woodruff Keyseat Cutters

.0003 HOLE LOCATION IN ONE MINUTE

Thousands of companies and individuals have proven and accepted our **EDGE FINDERS** for years. Ask for literature with users list and dealer in your area. Hardened and ground on all surfaces including contours for balance. .500" size \$2.50. Deluxe 200" size \$10.00. Vice stop for holding same hole location in several pieces \$2.95.

Postpaid Except C.O.D. Charges

GLOVER MFG. CO.

423 PARK AVE MEADVILLE, PA.



*Your advertisement
in this 1960 edition
will give you . . .*



ASSURANCE that your product story will be in the hands of 30,000 key buying influences in the metalworking industry thruout 1960.

COMPLETE COVERAGE in the book . . . including cross references to your advertisement in the Products Index and Manufacturers Address section, listings of your products in the Advertisers Index and the listing of your distributors in the Distributors sections.

INSURANCE that important people who may never be seen by your salesmen will have your product story . . . company and product identity insurance.

CONFIDENCE that your advertisement will go on working for many years, familiarizing persons who will some time be primary buying influences with your name and products.

A CHECKING COPY of this valuable, hard-covered, sewn, "desk-size" volume for your own use.

. . . so reserve space now !

**HITCHCOCK'S MACHINE AND TOOL DIRECTORY
WHEATON, ILLINOIS**

Use postpaid card, Circle No. 424

Don't Overlook These Features

blue book

Interview. One important reason why the Maytag makes such a good showing in the highly competitive home laundry appliance field is their unique system of cooperative interchange of ideas among personnel. In this exclusive interview Fred Maytag tells about his basic concept of reliability, the company's work simplification program, their budget system and their research and development program.

Numerical Control at General Electric. The newly installed numerically controlled machine tools being used to produce tailor-made parts for steam turbine-generators at GE's plant demonstrate a continuing policy of upgrading their ability to produce steam turbine generators. Here is more evidence that numerical control as a production technique and a controller of cost is developing rapidly.

Incentives for Inspectors. Author Harold R. Nissley tells why the dangers and problems of incentives for inspectors are no worse than incentives for production workers. If a system of proper checks and balances is set up before installation of the plan, the end results can be improved inspector morale, better inspectors and even better quality of product.

Precision Blanking and Piercing. Now available to industry is a precision blank and pierce die processing service that provides an excellent opportunity to produce many sheet metal products formerly avoided because of excessive tooling costs. This picture-story describes the dies, shows how they are built and illustrates the economic feasibility of this greatly simplified tooling process.

Boring Large Diameters. Boring roll shells, usually made of cast iron, and ranging in bore diameter from 12 inches to 60 inches and in length from 24 inches to 260 inches, is a common operation at the Black-Clawson Co. shops. The article presents design information and particulars about feed and operation practices for the four shopmade boring bars.

Hand Milling Machines. The Irwin Auger Bit Company makes economical use of hand mills on three of their production lines. The lever-operated set-up makes it possible for operators to take milling cuts as fast as the piece can be locked and the lever moved.

PAGE

87

97

108

116

120

128

19,000

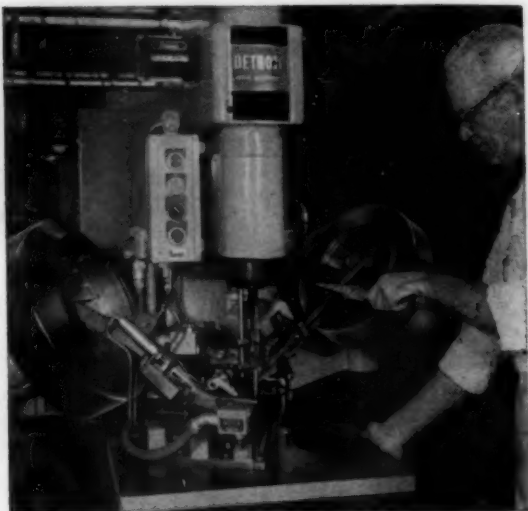


ASSEMBLIES

...all in a
day's work
for

DPS

special assembly machines



True to its name, Automatic Electric Company has made this small parts assembly *fully automatic* with a DPS assembly machine. A subsidiary of General Telephone & Electronics, Northlake, Ill., the company has realized increased capacity with fewer rejects on telephone terminal assemblies. This type of machine in similar assembly operations has paid for itself in less than a year from savings over previous method.

If you have a small parts assembly problem, talk it through with Detroit Power Screwdriver Company. Industry's most advanced design screwdriving machine is the result of more than three decades of specialization. Write for full facts.



**DETROIT POWER SCREWDRIVER
COMPANY**

15,136

2809 W. Fort St. • Detroit 16, Michigan
A Subsidiary of Link-Belt Company

Use postpaid card. Circle No. 425



Introducing the NEW MODEL 1-A SEVER-ALL Machine... CUTS AT 3 to 6 SECONDS PER SQUARE INCH—ECONOMICALLY

LOW COST • Priced at less than \$500, delivered.

BIG CAPACITY • Up to 2" square solids, 3½" O. D. pipe and tubing, 3" angle iron, and 4" channels. Wheel oscillation, an exclusive feature in this price range, provides this *above-average* capacity.

SPEED • Cuts a 2" x 2" hardened steel bar in 16 seconds . . . practically any metal at 3 to 6 seconds per square inch.

QUALITY • Clean, smooth cuts, even on large sections, because wheel oscillation provides cooler cutting.

VERSATILITY • Cuts cold rolled, stainless, and alloyed steel; cast iron; and non-ferrous metals.

ECONOMY • Occupies minimum floor space . . . eliminates annealing costs . . . gives more cuts per wheel as a result of oscillation.

SIMPLICITY • Just two SEVER-ALL cutting wheel specifications will do *all* your SEVER-ALL cutting jobs. Little or no set-up time required.

NEW SEVER-ALL AVAILABLE FROM DISTRIBUTORS

Very likely your own distributor already stocks the Model 1-A SEVER-ALL Abrasive Cutting Machine and Wheels. If not, we'll give you the name of your nearest SEVER-ALL distributor. We'll also be glad to send you complete details on this new machine. Just ask for Bulletin DH-106.

**ALLISON-CAMPBELL DIVISION
AMERICAN CHAIN & CABLE**

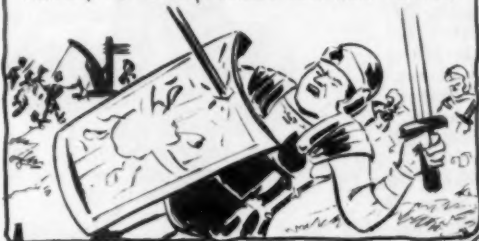
937 Connecticut Avenue, Bridgeport 2, Conn.
Use postpaid card. Circle No. 426



Mechanics Through The Ages



A SORT OF GIGANTIC CROSSBOW, CALLED THE CATAPULT, USED IN WAR BY THE ANCIENT ROMANS, COULD HURL A 3-FOOT ARROW 1100 FEET AND PENETRATE A SHIELD, 1½" THICK, COVERED WITH IRON PLATE!



AS EARLY AS 1874, ONE CALIFORNIA FARMER THRESHED A RECORD 5,779 BUSHELS OF WHEAT IN A SINGLE DAY WITH THE HELP OF A GIGANTIC STEAM-OPERATED SEPARATOR BUILT BY A BLACKSMITH WORKING IN A FARM MACHINE SHOP OWNED BY THE FARMER.

YEARS AFTER

THE COMPASS HAD BEEN INVENTED, SUPERSTITIOUS SKIPPERS, IT IS SAID, REFUSED TO USE IT BECAUSE THEY BELIEVED AN "ARABIAN NIGHTS" TALE THAT SHIPS EQUIPPED WITH COMPASSES OR IRON NAILS WOULD BE ATTRACTED TO A "MAGNETIC MOUNTAIN" AND DRAWN TO DESTRUCTION!



Products Index

MACHINE AND TOOL blue book

- Abrasive Cloth, Paper, Discs,
Stones, Belts, etc., 41, 181,
262
- Abrasives, rubber bonded, 181
- Adapters, 86
- Aerators, 242
- Air Control Equipment, 245
- Air-Operated Equipment, 23
- Air Tools, 23
- Alloys, 22
- Aluminum, bars, 69
- Angle Irons, 78
- Angle Plates (See: Plates, angle)
- Arbors, 60
- Assembly Machines, 251
- Automation Equipment, 135
- Bacterial Inhibitors, 30-31
- Bags, 232
- Balancing Machines, 59
- Balancing Tools, 59
- Bar Machines, automatic, 7,
16-17, 62
- Barrels, finishing, 75
- Bars, aluminum, (See: Aluminum,
bars)
- Bearings, roller, 142
- Benches, work, 224
- Bending Machines & Equipment,
42, 96, 162, 240
- Binoculars, 222
- Blades, cut-off (See: Tools,
cutting-off, blade)
work support, 205
- Blanks, chuck jaw, 179
circular form tools, 72
- Blocks, step
- Bolts, 198
- Boosters, 245
- Boring, jig, 234, 239, 244
- Boring Bars and Tools, 86, 146,
151
- Boring, Drilling, Milling Ma-
chines, 34
- Boring, Facing Heads, 224
- Boring Heads, 146, 191, 224
- Boring Machines, 50
jig, 46, 244
- Boring Mills, 46
- Boxes (See: Pans, tote)
- Burnishing Machines, 145, 167
- Burs, carbide, 263
- Bushings, 55, 142, 233, 240
drill and jig, 55, 151
tap, 240
- Calipers, 204
- Cam Milling, 244
- Cams, 235, 241
- Carbide Inserts, 13, 203
- Carbide Stock, 13
- Carbide Tools (See: Tools,
carbide)
- Center Laps, 204, 244
- Centers, live, 194, 201, 229
- Chuck Actuators, 257
- Chucks, 151
collet, 151
lathe, 228
power, 28, 257
scroll, 28
- Clamping Tools, 179, 197, 198,
221
- Clamps, 190
"C" 190
fixture, 151
- Clutches, 255
- Collet Closers, 234
- Collet Fixtures, 1
- Collet Tubes, 264
- Collets, 32a, 264
- Comparators, dial, 220
optical, 218
- Control Systems, 45
- Coolant Additives, 30-31
- Coolant Nozzles, 242
- Counterbores, 238
- Countersinks, 63, 216
- Cut-Machining Units, 239
- Cut-off Blades, 39
- Cut-off Machines, 20-21, 54,
58, 226, 252
- Cutters, inserted blade, 127
milling (See: Milling Cutters)
- Cutting Fluids, Oils, 11, 35
water soluble, 215
- Cutting Tools (See tool section)
- Cylinders, hydraulic, pneumatic,
209
- Deburring Machines, Tools, 75
- Dial Indicators, 185
- Die Casting Machines, 7
- Die Makers' Supplies, 242
- Die Sets, 220
- Die Sinking Cutters, 242
- Die Stock, 164, 169
- Dies, 173
- Dividing Heads, 211
- Dowel Pins (See:
Pins, dowel)
- Drill Guides (See:
Bushings, drill & jig)
- Drill Heads, multiple spindle,
192, 196
- Drilling Attachments, 68
- Drilling Equipment, 222
- Drilling Fixtures, 67
- Drilling Machines, 20-21, 34,
96
radial, 46, 56-57, Inside
Back Cover
sensitive, 20-21
turret, 56-57
- Drills, 216
core, 127
high speed, 241
taper, 200
twist, 200
- Duplicating Attachments, 45
- Dust Collectors, 247
- End Mills, 51, 242
- Engravers, 73, 179
- Face Mill Cutters, 51
- Facing Heads, 191, 224, 262
- Facing Tools (See: Tools, facing)
- Feeders, parts, 153
- Feeds, press, 76
- File Systems, 190
- Files, 105
rotary, 237
- Filing Machines, 32b
- Fixtures, drilling
(See: Drilling Fixtures)
- Flanging Machines, 165
- Fluid Power Training, 64
- Forgings, drop, 179

*The World's Most
Respected Name in
Industrial Clutches for
Over a Half-Century*

JUST DO THIS



two sides to this coin

The ease of installation for the Conway Manual Clutch is a tradition. But "heads up" even this has been improved with the fabulous STATIONAIRE by Conway.

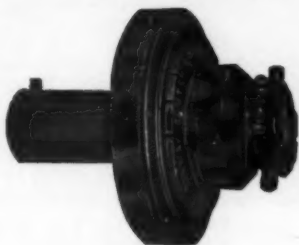
here's why

Complete installation of STATIONAIRE requires but 4 extremely simple, labor-saving steps . . . practically no work at all:

1. Attach to unit to be driven.
2. Slide clutch onto shaft.
3. Tighten set screw.
4. Hook up air line.



YOU DON'T DO THIS



Save on these extra steps needed to install manually controlled clutches (as on our P25-A easy to install):

1. Line up yoke.
2. Drill holes for fulcrum.
3. Mount fulcrum.
4. Mount yoke on shifter mechanism.
5. Connect yoke to fulcrum.

*Whether heads or tails, Conway does it better, faster
and with tremendous savings.*

WRITE FOR CATALOGS

The CONWAY CLUTCH COMPANY

1105 MARSHALL ST.

CINCINNATI 25, OHIO

Use postpaid card. Circle No. 427

PRODUCTS INDEX

- Forming Machines, 12, 96
 - roll, 159, 182
- Furnaces, electrical, 168, 202
 - gas, 130, 174
 - heat-treating, 130, 168, 174, 202
- Gage Blocks, 27, 179
- Gages, 218
 - dial, 185, 220
 - internal, 27, 218
 - micrometer (See: Micrometer Dial Gages)
 - snap, 27, 178
 - surface finish, 217
- Gaging Equipment, 27, 220
- Gear Production Equipment, 14-15
- Gear Shapers, 14-15
- Gear Units, 206
- Gears, 216
 - geneva, 235
 - helical, 216
 - worm, 216
- Grinders, air, 208
- Grinding Attachments, 8-9
- Grinding Machines, 167
 - bench, 145
 - disc, 145
 - drill, 18-19, 212
 - flute, 180, 218
 - heavy duty, 145
 - optical projection, 193
 - pedestal, 145
 - precision, 156
 - surface, 46, 156, 189
 - tap, 218, 243
 - tool & cutter, 18-19, 20-21, 156, 167
 - vertical spindle, 46
 - wet or dry, 189
- Grinding Wheels, 36-37, 52, 181, 262
 - cut-off, 252
- Grooving Tools (See: Tools, grooving)
- Hammers, 119
 - lead, 204, 236
- Handles, hammer, 204
 - machine, 179, 226
- Hinges, 206
- Hoists, 96
- Holders, tap and die, 107
 - tool, 107, 170
 - type, 230, 246
- work, 78, 166, 179
- Holding Fixtures, 1
- Hole Cutters, 198, Back Cover
- Hones, portable, 186
- Honing Tools, 68
- Hydraulic Equipment, 245
- Indexing Machinery, 235
- Insert Chasers, 203
- Inspection & Measuring Devices, 217, 218, 220
- Jig Boring, 234, 239, 244
- Jig and Fixture Components, 151, 179, 198
- Jig Grinding, 234
- Jigs & Fixtures, 151, 179, 198
- Keys, machine, 244
 - Woodruff, 244
- Keyseaters, 195, 242
- Knobs, machine, 179, 198, 226
- Lapping Machines, 49
- Lapping Tools, 204, 244
- Laps (See: Center Laps)
- Lathe Attachments, 29, 184
- Lathes, 20-21, 26, 46
 - engine, toolroom, 26, 46
 - precision, 43, 46
 - turret, 2, 46, 133
- Layout Dye, 210
- Levers, 226
- Lighting Equipment, 113, 223
- Lubricators, 235
- Magnifiers, 222
- Mandrel Drivers, 68
- Marking Devices, Stamps, 155, 199, 246
- Materials Handling Equipment, 149
- Metal Forming Machines, 12
- Metal Repair Compound, 232
- Micrometer Dial Gages, 27
- Microscopes, 27
- Milling Cutters, 53, 71, 127, 170, 180
- Milling Machine Attachments, 45, 65
- Milling Machines, 34, 46, 65
 - vertical, 10, 46, 65
- Mills, hollow, 170
- Mist Collectors, 227
- Mist Generators, 235
- Motor Arbors, 60
- Motors, air, 23
- Mounting Equipment, 163
- Nibbling Machines, 165
- Notching Equipment, 237
- Notching Machines, 165
- Nuts, flanged, 198
- Optical Inspection Devices (See: Inspection & Measuring Devices)
- Packaging Equipment, 232
- Pans, tote, 224
- Pantographs, 73, 179
- Parts Bins, 224
- Parts Feeders, 153
- Pins, dowel, 178
 - taper, 244
- Pipe & Tube Mills, 159, 182
- Plates, angle, 166
- Point Positioning Systems, 135
- Press Brakes, 32, 84, 96, 115, 219
- Press Room Equipment, 96
- Presses, arbor, 70
 - automatic, 76, 140
 - forcing, 74
 - gap type, 236
 - mechanical, 48
 - O.B.I., 25, 48, 76, 161
 - pneumatic, 48, 70
 - punch, 12, 38, 70, 136, 165
 - turret punch, 38, 136
- Pumps, coolant & lubricant, 44, 240
- Punches, 234
- Punches & Dies, 40
- Punching Equipment, 96, 240
- Pusher Tubes, 264
- Pushers, 264
- Racks, machine, 244
- Reciprocating Tools, 238
- Reproduction Equipment, 225
- Rivet Spinners, 178
- Riveting Machines, 178
- Rolling Mills, 96
- Saw Blades, band, 24, 119
 - circular, 79
 - cut-off, 39
 - hack, inside Front Cover, 24, 119
 - hole, 119
 - slitting and slotting, 39, 79
- Sawing Machines, 96
 - band, 20-21, 207, 213

PRODUCTS INDEX

contour, 32b
cut-off (See: Cut-off Machines)
hole, Outside Back Cover
Saws, hole, Outside Back Cover
Scrapers, power, 160
Screw Machines, (See: Bar
Machines, automatic)
hand, 20-21
Screws, 198
Services: Boring, Grinding,
Lapping, Milling Repairing,
etc., 234, 239, 244
Shapers, 32
Sharpening Stones, 41
Shearing Machines, 32, 70, 96,
165, 171
Shears, lever, 238
Sheet Metal Machinery, 171, 219,
226
Shelving, 224
Sleeves, 210
square hole, 187
Slitting Cutters, 39, 79, 165, 182
Slotters, 39, 165
Sockets, 210
Spindles, boring, 33
grinding, 33
Stamps, steel, 155, 199, 230, 246

Steel Stock 22, 119, 164, 169
Stock Carts, 224
Surface Finish Indicators, 217
Swaging Machines, 61
T-Nuts & Stud Sets, 198
Tables, elevating, adjustable, 149,
214
rotary, index, 23, 166, 235,
257
Tap Extensions, 188
Tap Sharpeners (See: Grinding
Machines, tap)
Tapping Attachments, 52
Tapping Machines, 83
Taps, 47, 261
Thread Rolling Attachments, 80
Thread Rolling Machines, 80
Threading Attachments, 62
Threading Machines, 96
Tool Holders, 66, 151
Tooling, automatic, 135
Tools, boring, 66
carbide, 51, 71, 180, 205,
228, 233, 263
circular, 79
cutting-off, blade, 39, 71, 239,
240

facing, 127
grooving, 224
hole cutting, 198
honing, 186
portable, electric, 238
Transfer Punches, 234
Trucks, service, 224
Tube Fabricating Equipment, 237
Tube Fabricating Machines, 159,
182
Turning Heads, 224
Turrets, lathe, 29, 184
Type Holders, 230, 246

Valves, hydraulic, 3
Vibration Control, 163
Vises, bench and machine, 151,
166, 221, 231

Welding Equipment & Supplies, 96
Wheels, 179, 226
White Print Machines, 225
Work Benches, 224
Wrenches, 4
impact, 4
socket, 4
torque, 4, 230

PRECISION INDEXING

TO 0.001"

with GEM-17 DIAL INDEX TABLE

True geneva motion gives positive lock, speeds to 1/4 sec. Rugged 1000 lb. fixture load capacity with solid anvil capacity of 30 tons. Standard 17" dia. (plates to 36" available). Gray's engineering staff will adapt tables to your work problems.

Send for Bulletin DI-17 and full information.

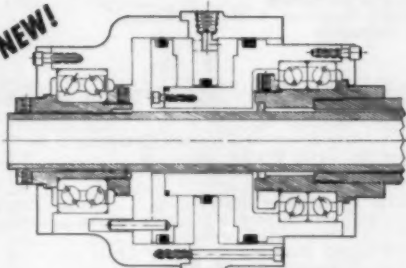


GRAY EQUIPMENT CO.
13600 FORD ROAD
DEARBORN, MICHIGAN

Use postpaid card. Circ'e No. 428

August, 1959

NEW!



Power Grip CHUCK ACTUATOR

- For Bar and Chucking Work. Hole in air chuck and Actuator converts chuck to bar work.
- For High Speed, Vibrationless Holding. No limit on spindle speeds.
- For Frequent Starting And Stopping. No rotating mass to create flywheel effect.
- For Constant Holding Pressure. Regulated air pressure provides consistent holding.
- For Feeding Coolant, Cutting Tools, or Work Pieces Through the Spindle.

For further information, write

PowerGrip, Inc.
Rockfall, Conn.

Use postpaid card. Circ'e No. 429

257

Index to Advertisers



A

A. K. Tool Company, Inc.	234
Accurate Bushing Company	67
Ace Drill Bushing Company	55
Acme-Danneman Company, Inc.	220
(Danneman Die Set Division)	
Acme Tool Corp.	238
Adjustable Clamp Company	190
Aget Manufacturing Company	247
Agon Engineering Company	248
Allegheny Ludlum Steel Corporation	169
Allen Collet Manufacturing Company	264
Almo Queen Products Division	75
(King-Seeley Corporation)	
Alvin Products, Inc.	232
American Chain & Cable Company	252
(Allison-Campbell Division)	
American Pullmax Co., Inc.	165
American Roller Die Corporation	159
American Saw & Manufacturing Company	Back Cover
American Tool Works Company	Inside Back Cover
Anderson Brothers Manufacturing Company	160
Armstrong-Blum Manufacturing Company	Inside Front Cover
Armstrong Bros. Tool Company	4
Atrax Company	263
Auto Moulding & Manufacturing Company	206

B

Balas Collet Manufacturing Company	32a
Baldor Electric Company	167
Bay Products, Inc.	224
Bay State Abrasive Products Company	36-37
Beaver Gear Works, Inc.	216
Behr-Manning Company	41
Bellows Company	23
Bijur Lubricating Corporation	235
Black Diamond Saw & Machine Works	243
Blake Company, Edward	243
Blanchard Machine Company	52
Bliss Company, E. W.	25
Boggis & Company, Henry P.	218
Bokum Tool Company	66
Boyar-Schultz Corporation	204
Bremil Manufacturing Company	238
Brightboy Industrial Division	181
(Weldon Roberts Rubber Company)	
Brown & Sharpe Manufacturing Company	51
(Cutting Tool Division)	
Buck Tool Company	28
Bunting Brass & Bronze Company	69
Burg Tool Company	56-57
Byco Industries	240

C

Capewell Manufacturing Company	119
Chandler Tool Company	224
Chicago Tool & Engineering Company	166

Cincinnati Milling Machine Company	8-9
(Grinding Machine Division)	
Cincinnati Milling Machine Company	35
(Products Division)	
Cincinnati Shaper Company	32
Circular Tool Company, Inc.	79
Clark Company, Robt. H.	158
Clearing Division	161
(U. S. Industries, Inc.)	
Clemson Brothers, Inc.	24
Cleveland Automatic Machine Company	7
Cleveland Crane & Engineering Company	115
Cleveland Grinding Machine Company	193
Cleveland Punch & Shear Work Company	40
Coasidill Twist Drill Company, Inc.	200
Collis Company	210
Commander Manufacturing Company	192
Concentric Tool Corporation	194
Conway Clutch Company	255
Cook's Lead Hammer Service	236
Cutting Tools, Inc.	248

D

Danneman Die Set Division	220
(Acme-Danneman Company)	
Davis Keyseater Company	195
Delta Power Tool Division	20-21
(Rockwell Manufacturing Company)	
Detroit Power Screwdriver Company	251
DeVlieg Microbore	86
(Division DeVlieg Machine Company)	
Dion Machinery, Inc.	171
Dixie Tool Industries	242
Dreis & Krump Manufacturing Company	219
Dykem Company	210

E

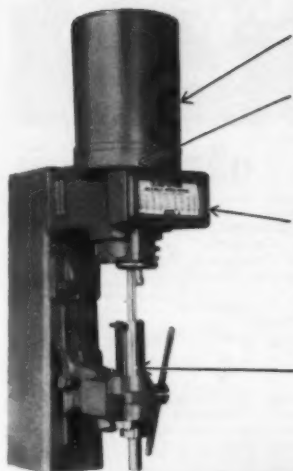
Eastern Machine Screw Corporation	203
Eclipse Counterbore Company	127
Edroy Products Company	222
Eisler Engineering Company, Inc.	235
Electric Machinery Mfg. Company	113
(Mullenbach Division)	
Emch Tool & Engineering Company	206
Empire Tool Company	107
Enco Manufacturing Company	184
Ex-Cell-O Corporation	33-49

F

Famco Machine Company	70
Fellows Gear Shaper Company	14-15
Felters Company	163
Fenn Manufacturing Company	61
Flick Reedy Corporation	245
(Miller Fluid Power Division)	
Flynn Manufacturing Company	237
Fostoria Pressed Steel Corporation	223

G

Gallmeyer & Livingston Company	156
Gisholt Machine Company	133



1. TOTALLY ENCLOSED MOTOR

Windings and air gap completely protected from dust, dirt, chips.

2. DIRECT DRIVE

Direct drive from four-speed motor to spindle for smooth power transmission. For extreme speed range, can be furnished with back gears. Speeds from 90 RPM up to 3600 with torque multiplication up to six times supplies brute power for large drills, ample speed for drills down to $\frac{1}{8}$ ".

3. INDICATING SHIFT

For positive speed indication. Tells right speed to use for drill sizes in three different SFM ranges. Convenient hand wheel shifts speed without stopping machine.

4. OIL MIST LUBRICATION

Radial-thrust ball bearings are constantly and properly lubricated at all speeds by oil mist. Spindle spines lubricated by felt wipers.

5. OVERSIZE SPINDLE QUILL

Oversize quills are $2\frac{3}{8}$ " in diameter. Large bearing area maintains accuracy and assures long life.

**Only LELAND-GIFFORD Drilling Machines
have all these Precision Features**

6. INSERTED STEEL RACK

Inserted steel rack prevents radial motion which can cause uneven tooth loads on feed pinion. Also insures accurate alignment when multiple heads are used.

7. BROACHED SLOT

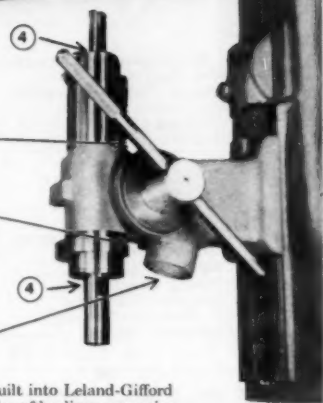
Rack slides in slot precision broached into head.

8. SPINDLE GUARDS

Telescopic guard can be furnished to completely cover the spindle, protect operator from fast-moving multiple spindles.

9. BUILT-IN LIGHT

Built into sliding head. Puts the light on the work where it ought to be. Never in the way like makeshift lighting.



Compare the quality, workmanship and precision features built into Leland-Gifford Drilling Machines and you will see why they are the first choice of leading companies for toolroom and production lines.

LELAND-GIFFORD

Drilling Machines

WORCESTER 1, MASSACHUSETTS, U. S. A.

Branch Offices:

CHICAGO 3
2515 W. Peterson Ave.
CLEVELAND 22
P. O. Box 853
DETROIT 21
10429 W. McNichols Rd.
INDIANAPOLIS 6
P. O. Box 1031

LOS ANGELES
2620 Leona Blvd.,
Van Nuys 28, Cal.
NEW YORK
75 S. Orange Ave.,
South Orange, N. J.
ROCHESTER 12
P. O. Box 24,
Charlotte Station

Glover Manufacturing Company	248
Grant Manufacturing & Machine Company	178
Gray Equipment Company	257
Graymills Corporation	240
Greaves Machine Tool Company	65
Green Instrument Company, Inc.	73
Greenlee Brothers & Company	62
Grice, Inc.	225

H

HvH Tool & Instrument Company	178
Hamilton Tool Company	149
Heimann Manufacturing Company	246
Hi-Lo Products Co. Division	197
(Steel City Testing Machine, Inc.)	
Himoff Machine Company	244
Hitchcock Publishing Company	64-249
Homstrand, Inc.	26
Hones, Inc., Charles A.	174
Huppert Company, K. H.	202
Hy-Pro Tool Company	47

I

Ideal Industries, Inc.	229
Index Industrial Corporation	43
Ingersoll Milling Machine Company	71

J

J & S Tool Company	201
Jergens Tool Specialty Company	179
Johansson Gage Company, C. E.	27
Johnson Gas Appliance Company	130
Johnson Machine & Press Corporation	236
Jones and Lamson Machine Company	50

K

Kaufman Manufacturing Company	83
Keo Cutters, Inc.	216
Kidde Precision Tool Corporation	239-241
King-Seely Corporation	75
(Almco Queen Division)	
Kitzman Manufacturing Company	204

L

L. W. Chuck Company	211
Landis Machine Company	80
Lapeer Manufacturing Company	221
Leland Gifford Company	259
Lilly & Company, Eli	30-31
Linley Brothers Company	244
Lodge & Shipley Company	84
Logansport Machine Company	3
Lucifer Furnaces, Inc.	168

M

M.B.I. Export & Import, Ltd.	231
Machine Products Corporation	226
Madison-Kipp Corporation	208
Mahr Gage Company, Inc.	220
Manhattan Supply Company	228
McDonough Manufacturing Company	212
Micrometrical Manufacturing Company	217
Midwest Tool & Engineering Company	214
Miller Fluid Power Division	245
(Flick-Reedy Corporation)	
Minster Machine Company	76
Modern Machine Tool Company	54
Modernair Corporation	209
Morse Twist Drill &	

Machine Company	18-19
Match & Merryweather Machine Company	39
Mullenbach Division	113
(Electric Machinery Manufacturing Company)	
Mummert-Dixon Company	262

N

Neise, Karl A.	191
Newtools, Inc.	244
Niacara Cutter	180
(Div. Bollier-Damrell, Inc.)	
Nicholson File Company	105
Nilson Machine Company, A. H.	12
Noble & Westbrook Manufacturing Company	155
Northland Bag Corporation	232
Northwestern Tools, Inc.	198
Numberall Stamp & Tool Company	230

O

Oliver Instrument Company	32b
Oliver Machinery Company	226
O'Neil-Irwin Manufacturing Company	136
Opto-Metric Tools, Inc.	218

P

Pannier Corporation	246
Peaslee Metal Products, Inc.	178
Pedrick Tool & Machine Company	42
Penniman, Elsie	248
Perkins Machine Company	48
Pine's Engineering Company, Inc.	162
Portage Double-Quick, Inc.	146
Portage Machine Company	34
Power Grip, Inc.	257
Precision Processing Company	29
Preis Engraving Machine Company, H. P.	179

Q

Queen City Machine Tool Company	145
---------------------------------------	-----

R

Reading Machine Company	242
Richards Company, J. A.	240
Rico Tool Company	228
Robert Zapp-Fortuna	22
Rockwell Manufacturing Company	20-21
(Delta Power Tool Division)	
Rodgers Hydraulic, Inc.	74
Roll & File Systems, Inc.	190
Rota-File Corporation	237
Ruthman Machinery Company	44
Ryerson & Son, Inc., Joseph T.	96

S

S & E Machine Products Company	233
S & S Machinery Company	46
Sales Service Manufacturing Company	140
Sanford Manufacturing Company	189
Scherr Company, Geo.	179-185
Schmidt, Inc., Geo. T.	199
Schrillo Aero Tool Engineering Company	63
Schupack Supply Company	262
Sid Tool Company	261
Somma Tool Company	72
Sonnet Tool & Manufacturing Company	142
Spellman Company, R. K.	234
Standard Steel Specialty Company	244
Steel City Testing Machines, Inc.	197
(Hi-Lo Products Co. Division)	

Sid Tool Company

WHY WAIT FOR SPECIAL TAPS?

Has them **IN STOCK**
for **IMMEDIATE DELIVERY!**

HIGH SPEED SPECIAL RIGHT HAND TAPS

SIZE	THREAD	SIZE	THREAD	SIZE	THREAD
00	96	15/32	32	1-3/4	3-8-10-12-14-16-18-20-24
0	70-72-76-80	1/2	12-13-14-16-18-20-24-27-28-32-36-40	1-13/16	8-10-12-14-16-18-20-24-32
1	48-52-54-56-64-72-80	9/16	12-14-16-18-20-24-27-28-32-36-40	1-7/8	5-8-10-12-14-16-18-20-24
2	40-44-46-48-50-54	5/8	10-11-12-14-16-18-20-24-27-28-32-36-40	1-15/16	5-6-8-10-12-14-16-18-20
3	32-36-40-48-56-60-64-72-80	11/16	10-11-12-14-16-18-20-24-27-28-32-36-40	4-1/2	8-10-12-14-16-18-20
4	30-32-36-40-44-48-56-64-80	3/4	10-11-12-14-16-18-20-24-27-28-30-32-36-40	2-1/16	12-14-16
5	30-32-36-40-48-56-60-64-72-80	13/16	10-12-14-16-18-20-24-27-32	2-1/8	8-10-12-14-16-18-20
6	24-30-36-40-48-56-60-64-72-80	7/8	9-10-12-14-16-18-20-24-27-28-32-40	2-3/16	10-12-14-16
7	20-24-28-32-36-40-48-56-60-64	15/16	8-9-10-12-14-16-18-20-24-27-32-40	2-1/4	4 1/2-8-10-12-14-16-18
8	20-22-24-28-30-32-36-48-56-60	1	8-10-12-14-16-18-20-24-27-32-36-40	2-5/16	12-14-16-18
9	20-24-28-32-40	1-1/16	10-12-14-16-18-20-24-27-32	2-3/8	10-12-14-16-18
10	16-20-24-32	1-1/8	7-8-10-12-14-16-18-20-24-27-32-38	2-1/2	4-8-10-12-14-16-18
11/16	60-64-72	1-3/16	8-10-12-14-16-18-20-24-27-32	2-9/16	12-14
5/8	72	1-1/4	7-8-10-12-14-16-18-20-24-27-32	2-5/8	8-10-12-14-16-18
3/32	32-36-40-44-48	1-5/16	6-8-10-12-14-16-18-20-24-27-32	2-3/4	4-8-10-12-14-16
5/32	32-36-38-40-44-48	1-7/16	8-10-12-14-16-18-20-24-27-32	2-7/8	8-10-12-14-16
3/16	20-24-28-32-36-40-48	1-9/16	6-8-10-12-14-16-18-20-24-27-32	3	4-8-10-12-14-16
7/32	20-24-28-32-36-40	1-5/8	5 1/2-6-8-10-12-14-16-18-20-24	3 1/4	8-10-12-14-16
1/4	14-16-18-22-24-26-27-28-30-32-36-40-48-56-64	1-11/16	6-8-10-12-14-16-18-20-24-27-32	3 1/2	8-10-12-14-16
9/32	18-20-24-27-28-32-40-54			4	8-10-12-14-16
5/16	16-18-20-22-24-26-27-28-30-32-36-40-48-64				
11/32	20-28-32-40-48				
3/8	12-13-14-18-20-22-27-28-30-32-36-40-48				
13/32	16-20-24-32				
7/16	12-14-16-18-20-24-27-28-32-36-40				

HIGH SPEED LEFT HAND TAPS

SIZE	THREAD	SIZE	THREAD	SIZE	THREAD
0	80	3/8	16-24-32	1-3/8	6-8-10-12-16-18-20-24
1	56-64-72	7/16	14-20-28	1-7/16	8-10-12-14-16-18-20
2	56-64	1/2	12-13-20-28	1-1/2	6-8-10-12-16-18-20
3	56	9/16	12-18-20-24	1-9/16	8-10-12-16-18-20
4	32-36-48-48	5/8	11-12-18-20-24	1-5/8	8-10-12-14-16-18-20
5	40-44	11/16	11-16-24	1-11/16	8-10-12-14-16-18-20
6	32-36-40	3/4	10-16-18-20	1-3/4	8-10-12-14-16-18-20
8	32-38-40	13/16	16	1-13/16	8-10-12-14-16-18-20
10	24-28-32-48	7/8	9-12-14-16-20	1-7/8	8-10-12-14-16-18-20
12	24-28-32	1	8-12-14-16-18-20	1-15/16	8-10-12-14-16-18-20
1/4	20-28-32	1-1/8	7-12		
5/16	18-20-24-28-32	1-1/4	7-12-16-18		

• SPECIAL AND LEFT HAND DIES IN STOCK •

NOTE:

Oversize, Undersize, Metric, 64th and 32nd Size Taps Available for Quick Delivery. We stock Special Sizes in High Speed Milling Cutters, Slitting Saws, End Mills and Reamers.

DEALER INQUIRIES INVITED

If you are a user of cutting tools it will pay you to be on our mailing list. Write for circular now to Dept. B.

SID TOOL COMPANY, INC.

Cutting Tool Specialists

158 LAFAYETTE ST., NEW YORK 13, N. Y.

Telephone: BEekman 3-4270

Use postpaid card. Circle No. 431

Stewart Warner Corporation	59
Stone Machinery Company	58
Stromberg-Carlson	135
Stuart Oil Company, Ltd., D. A.	215
Sturdy Broaching Service	187
Sturtevant Company, P. A.	230
Sun Oil Company	11
Sunnen Products Company	186
Superior Hone Corporation	68

144 ABRASIVE WHEELS & POINTS

Brand New
Perfect First
Quality
Mounted on 1/4"
Steel Mandrels

ONLY
\$28.50

Postpaid
in U.S.A.
Imported



List value
\$93.60
Save
up to
\$65.10

72 Abrasive Wheels & Points on 1/4 in. steel mandrels \$26.50

COMPLETE IN HANDY STURDY
CONTAINER AT NO EXTRA COST

If after 10 days you are not fully convinced that this is the greatest wheel and point value in the industry, return the set at no cost or obligation on your part. Illustrated Free Catalog on Request.

SCHUPACK SUPPLY CO. Dept. MB-20
7331 Cottage Grove Ave. Chicago 19, Illinois
Use postpaid card. Circle No. 432

Supreme Keyseat Cutters Company	248
Syntron Company	153

T

Taft-Peirce, Inc.	78
Tannewitz Works, Inc.	207
Thriftmaster Products Corporation	196
Titan Tool Company	204
Tomkins-Johnson Company	53
Torit Manufacturing Company	227
Tree Tool & Die Works	10
True-Trace, Inc.	45
Twentieth Century Manufacturing Company	238

U

Universal Engineering Company	151
Universal Metal Hose Company	242

V

Vanadium-Alloys Steel Company	164
Vascoloy-Ramet Corporation	13
Victor Machinery Exchange, Inc.	241
Vogel Tool & Die Corporation	237

W

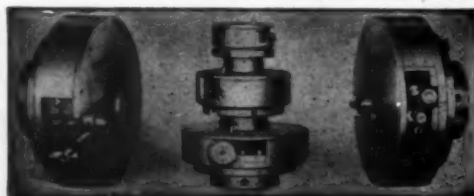
Wade Tool Company	2
Wallace Supplies Manufacturing Company	239
Walton Company	188
Wardwell Manufacturing Company	180
Warner & Swasey Company	16-17
Watts Brothers Tool Works	222
Weldon Roberts Rubber Company (Brightboy Industrial Division)	181
Wells Manufacturing Company	213
Whistler & Sons, Inc., S. B.	173
Wiedemann Machine Company	38
Wiley's Carbide Tool Company	205
Wilson Air Collet Closer, Inc.	234
Wirth & Son, Inc., Carl A.	170
Woods Machine Company, S. A.	60

Y

Yoder Company	182
---------------------	-----

Z

Zagar, Inc.	1
Zapp-Fortuna GmbH.	22



MUMMERT-DIXON FACING HEADS with Automatic Feed

One-way Tool Feed—8, 9 and
12" sizes.

Two-way Tool Feed—8, 12, 16
20, 24, 30, 36, 40 and 48" sizes.

Save many costly set-ups.

Bulletin No. 4141 Gives Full Details

MUMMERT-DIXON CO. 122 Philadelphia St., Hanover, Pa.

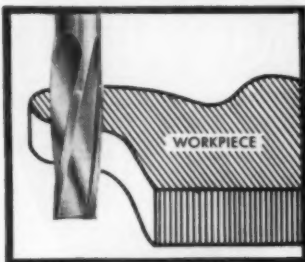
Use postpaid card. Circle No. 433

Precision Ground **ATrax** SOLID CARBIDE TOOLS AND BURS

Job Applications

BETTER PROFILE MILLING ON 302 STAINLESS WITH 4-FLUTE, SLOW SPIRAL SOLID CARBIDE END MILL

After failure of H.S.S. End Mill, a Series 1505, 5/16" diameter "standard stock" Atrax Carbide End Mill was used. Operation performed on a Bridgeport with hand feed. Stock removal between .025"-.030" on roughing cut and between .005"-.006" on finish cut, both with same tool. Speed — 2750 R.P.M.



SPECIFIC ADVANTAGES

of using this slow spiral, (approximately 15° right hand helix)



Solid Carbide End Mill is the strengthened tooth form and reduced rake angle, not obtained with the regular fast spiral. This Tool is designed and recommended especially for use on stainless steel and other

TOUGH TO MACHINE MATERIALS —

stellite, titanium, nickel, chrome, monel metal and high temperature steels. Another decided advantage — this Atrax Tool can be run at slower speeds for longer tool life without injury to cutting edge.

WHY USE A DIAMOND CUT BUR?

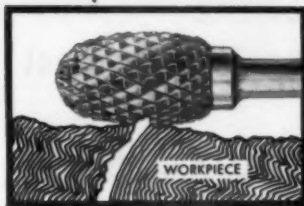
A diamond cut pattern which can be applied to a coarse, standard, or fine cut Bur is beneficial in the elimination of elongated slivers usually obtained when deburring such materials as stainless steel. In addition, the diamond cut provides greater operator control when used on hard materials, dies, molds, etc. and provides longer tool life on recommended applications.

NOTE: Speeds used with Diamond Cut Burs should be reduced by 1/3 to 1/2 the speeds of Burs with regular cut.

HOW AN ATRAX E-161 BUR WITH DIAMOND CUT WAS USED

Hand operated at 8000 to 12000 R.P.M.,

using a portable air grinder, an Atrax Oval Type Bur was used to remove flashing from nodular iron castings. Previously a H.S.S. Bur had been used with a tool life of 8 hours. The Atrax E-161 was removed for resharpening after 48 operating hours.



The job applications outlined here are taken from actual customer production experiences. We feel that this information can help you improve production, lower costs, and discover the superiority of Atrax Solid Carbide Tools and Burs.

SEND FOR 148 PAGE
"STANDARD REFERENCE"
ON SOLID CARBIDE TOOLS...



to: **THE ATRAX COMPANY**
240 DAY STREET, NEWINGTON 11, CONN.

Use postpaid card. Circle No. 434

collets, pushers, details

accuracy is our
Standard



Allen's Burn Style TAPER LOCK PUSHERS

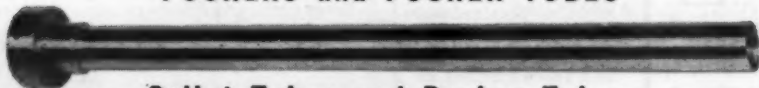
Automatic Adjustment
Positive Feed

Minimum Scratch
When Specified

SPECIAL DETAILS TO PRINT

Let Us Quote
Your Details

We Will Duplicate COLLETS, COLLET TUBES,
PUSHERS and PUSHER TUBES



Collet Tubes and Pusher Tubes

ALLEN COLLET MFG. CO., INC.

17720 CLARANN AVE. • MELVINDALE, MICHIGAN

Use postpaid card. Circle No. 435

MACHINE and TOOL BLUE BOOK

100% "AMERICAN"



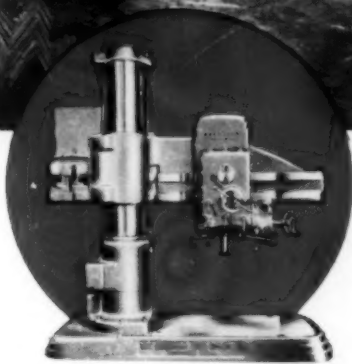
The Stupp Bros. Bridge and Iron Company of St. Louis, Missouri, known the country over as one of the leading structural steel fabricators, use "AMERICAN" Radial Drills exclusively.

Mr. Erwin P. Stupp, President, gives as his reasons for his continuous selection of "AMERICAN"—

- EASE OF HANDLING
- RIGIDITY
- FAST MANIPULATION
- LOW MAINTENANCE

These factors combined with the extra power offered by "AMERICAN" Hole Wizard Radials guarantee a handsome return upon the user's investment.

The half dozen "AMERICAN" Radials installed during the past 10 years are conclusive testimony to the satisfactory service afforded by these modern drilling, boring and tapping machines.



PLUS FEATURES

- Centralized Control.
- Lightning-fast Direct Reading Speed Change.
- Nitrided Spindle and Sleeve—practically wear proof.
- Timken mounted column unit defies deflection.
- Raybestos covered, spring steel tapping attachment friction bands, quick acting, wear proof, permitting 40% speed-up for spindle reverse.

Send for bulletin No. 328

THE AMERICAN TOOL WORKS CO. Established 1898 U.S.A.

LATHES AND RADIAL DRILLS



shatterproof **LENOX** HOLE SAWS

Even when the going is *extra rugged* — the **LENOX** HOLE SAW performs with precision and dependable safety.

The specially-designed, extra tough alloy back of the saw produces a cushion-like effect that absorbs the cutting impact. Dangerous shattering is completely eliminated, while saw breakage is negligible.



High speed steel welded edge



AMERICAN SAW & MFG. COMPANY
SPRINGFIELD, MASSACHUSETTS • U.S.A.

